PREPARATION OF UNIT FOR AIR MOVEMENT

612-510

References

DOD 4500.0-R, DTR, Part III, *Mobility*

FM 55-9, *Unit Air Movement Planning*

FM 3-35.4, *Deployment Fort-to-Port*

FORSCOM/ARNG Reg 55-1, *Unit Movemen*
Planning

Outline

- Unit Preparation for Air Movement
- Preparing Personnel for Air Movement
- Equipment Preparation and Joint Inspection
- Center of Balance
- Aircraft Load Planning
- Shoring

Unit Preparation for Air Movement

UMO - General Responsibilities

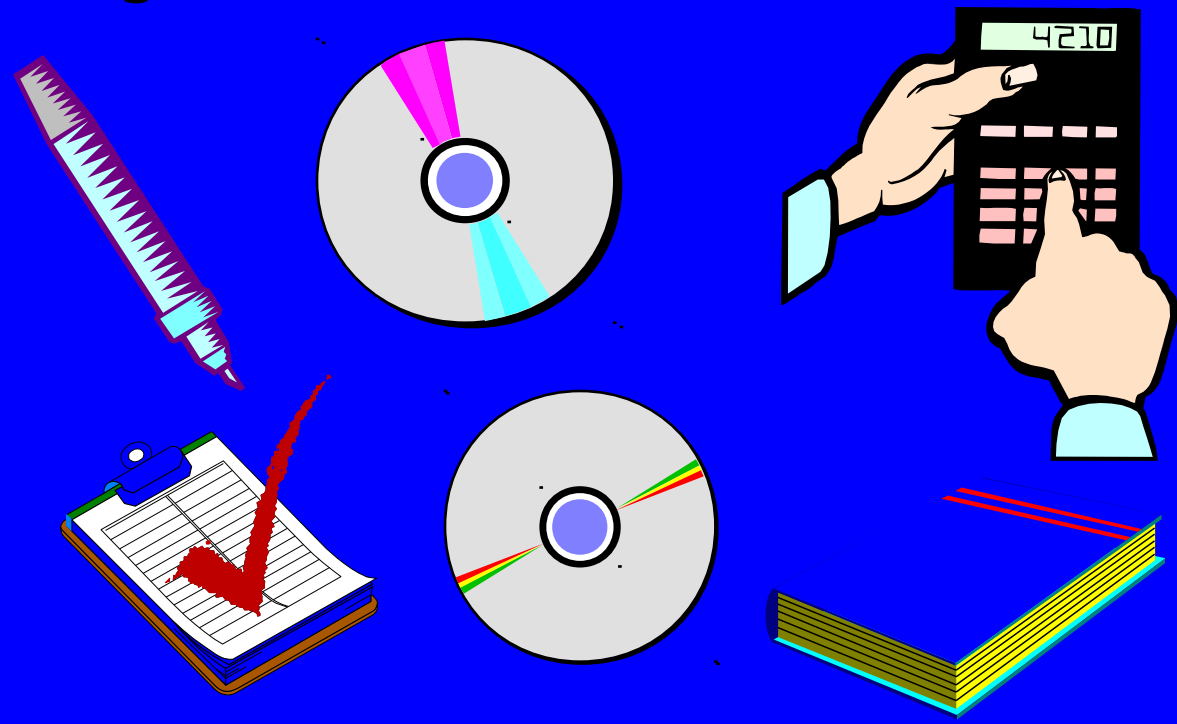
- UMO:

  Coordinates unit airlift planning and preparation activities.

  + Includes coordination with higher headquarters & UMC for unit support & procedures during movement to and processing at APOE.
  + Primary objective is to minimize the time a unit being moved is non-operational

Deployment Box

- Manuals / CD’s
- Measuring tape
- Duct tape
- Grease pencils
- Calculators
- Chalk
- Pallet Cards
- Pallet Bags
- DD 2131 / 2133
- TB 55-46-1



UMO/Unit Preparation Tasks

- Identify the number of personnel and type and quantity of cargo and equipment to be moved by air
- Prepare/review air movement plan with higher HQ. Plan should detail unit actions and include sequence of movement for troops & equipment
- Establishing unit priorities/sequence for arriving at APOD or area of operations
- Establish liaison with supporting agencies
- Identify the cargo or equipment that requires special handling based on shipping configuration or fragile/hazardous characteristics
- Request technical assistance to prepare equipment and train personnel available from higher HQ, installation UMC, A/DACG & TALCE [Air Force] (if required)

Ref: FM 3-35.4, p.L-1

UMO/Unit Preparation Tasks (cont)

- Plan and coordinate required administrative support, unit movement training, air movement planning, logistics and maintenance support, and prepare briefs for deploying personnel on standard safety practices in and around aircraft
- Assign unit movement or embarkation officer
- Plan movement to POE (convoy, rail, water, commercial truck)
- Establish trained load teams to assist the A/DACG
- Identify foreign border clearance requirements (if applicable)
- Enter force deployment requirements into TC-ACCIS/TC-AIMS II (DEL/UDL) to accurately reflect lift requirements and deployment priorities
- Determine requirements for vehicle cargo restraint devices

Ref: FM 3-35.4, p.L-1

UMO/Unit Preparation Tasks (cont)

- Review inspection procedures and documentation requirements for hazardous cargo
- Preparing & organizing soldiers for air movement (Includes designating key personnel, determining procedures for transportation of individual weapons and equipment procedures, aircraft safety & manifesting)
- Obtain BBPCT and determine aircraft shoring requirements, ensuring its availability before loading and establish destination disposition procedures
- Determining 463L pallets requirements (including net sets, plastic pallet covers and dunnage)

Ref: FM 3-35.4, p.L-1

UMO/Unit Preparation Tasks (cont)

- Prepare movement documentation (vehicle load plans, DEL) - consider secondary cargo and hazardous or sensitive cargo/equipment
- Preparing equipment & cargo to include 463L pallet & vehicle loads (Includes configuring equipment for air movement and weighing vehicles and marking center of balance) IAW DOD 4500.9 (Defense Transportation Regulations)
- Identify support requirements (MHE, scales, prime movers etc to the DACG)

Ref: FM 3-35.4, p.L-1

DACG Preparation Tasks

- Determine the number of personnel and type and quantity of cargo to be moved
- Determine the timeframe for loading
- Confirm the location or airfield(s) and marshaling area(s) with the installation or base commander and the deploying unit
- Determine available APOE logistic and administrative facilities
- Determine user support facilities (MHE, security, lighting, fuels, etc)
- Establish liaison with the deploying unit and other support activities

Ref: FM 3-35.4, p.L-2

DACG Preparation Tasks

- Coordinate with the TALCE to establish DACG training requirements
- Coordinate foreign border clearance requirements and procedures (if necessary)
- Obtain DEL/UDL of unit cargo and equipment to ve loaded. Identify any problems that will affect loading or require special attention to the TALCE
- Validate shoring requirements
- Ensure 463L pallet dunnage availability

Ref: FM 3-35.4, p.L-2

Preparing Personnel for Air Movement

Soldier Readiness Program

- **Personal readiness**
  - **Legal (will, power of attorney)**
  - **Financial (pay, credit cards, rent, car payments)**
  - **Medical / dental**
  - **ID card and tags / etc.**
  - **Individ ent**

Preparing Personnel for Air Movement

- Identify key unit personnel and assign duties & responsibilities
- Key positions include:

  Unit liaison to A/DACG:

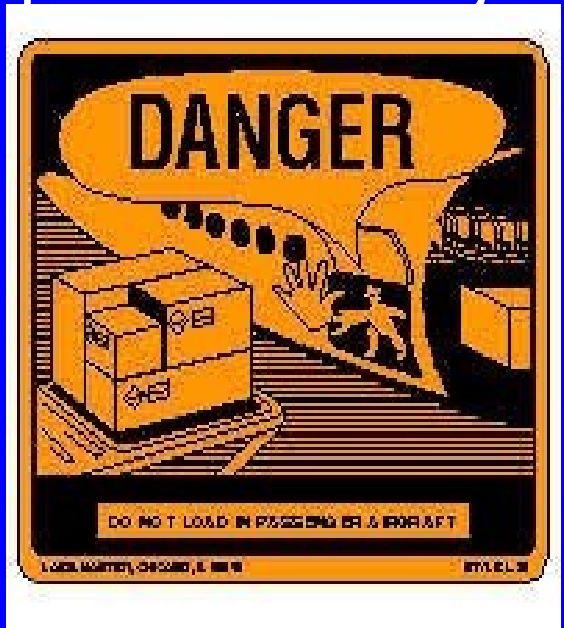
  - Facilitates communication between unit and A/DACG
  - Clarifies processing procedures and resolves problems

  Planeload or troop commander:

  - Assumes control of all passengers listed for movement on the flight
  - Ensures passengers are briefed on aircraft procedures
  - Ensures necessary support is provided during enroute stops

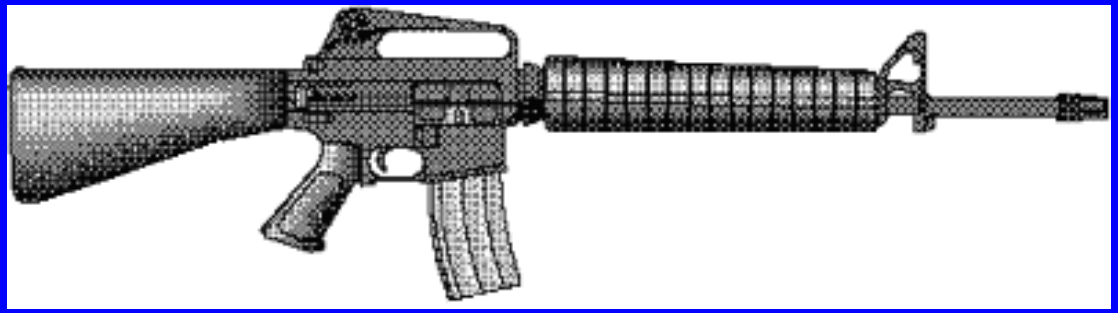
Preparing Personnel for Air Movement (cont)

- Training:
  Unit vehicle drivers & equipment operators may require training in aircraft loading & off-loading and proper procedures for restraining unit cargo (under aircraft load master supervision)
  Personnel preparing hazardous cargo for air movement require training & certification



Preparing Personnel for Air Movement (cont)

- Individual Weapons:
  Develop and brief individual weapons & ammunition procedures for airlift ops
  Reference TM 38-250 for instructions on packing & certification of ammunition
  Weapons should be “cleared” before boarding aircraft
  Personnel requiring loaded weapons must be identified to aircraft commander



Preparing Personnel for Air Movement (cont)

- Brief Personnel:
  Briefing should provide a basic understanding of in-flight responsibilities and procedures for disembarking aircraft.
  Briefing should include identification of key personnel (troop commander, load master)

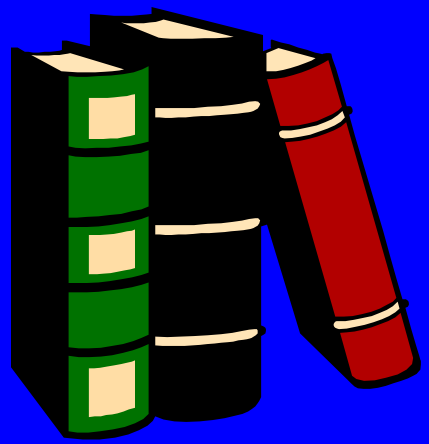
EQUIPMENT PREPARATION AND JOINT INSPECTION

Overview of Equipment Preparation

- Responsibilities
- Inspection Procedures
- DD Form 2133

Preparing Equipment and Cargo for Air Movement

- References for equipment preparation include:
  FORSCOM/ARNG 55-1, *Unit Movement Planning*, Chapter 5
  FM 55-9, *Unit Air Movement Planning*, Appendix B
  DD Form 2133, Joint Airlift Inspection Record



Joint Inspection Process

- Ensures that personnel, vehicles, supplies and equipment are airlifted safely
- Two steps
  - Prepare vehicles, supplies and equipment for the
  - The actual inspec

Ref: FM 3-35.4, p.K-1/2

Responsibilities

- All equipment must be properly prepared and documented before it can be loaded on any aircraft

Responsibilities

- **TALCE or MST**
  - Responsible for approving all aircraft loads
  - Supervising the loading/off loading and tie down of vehicles and cargo
  - Assuring compliance with applicable aircraft loading manuals
- **Transported Unit**
  - Responsible for setting up the movement precedence, cargo preparation and troop management
  - Preparing the documentation and on and off loading and restraining all cargo aboard AMC aircraft

Responsibilities

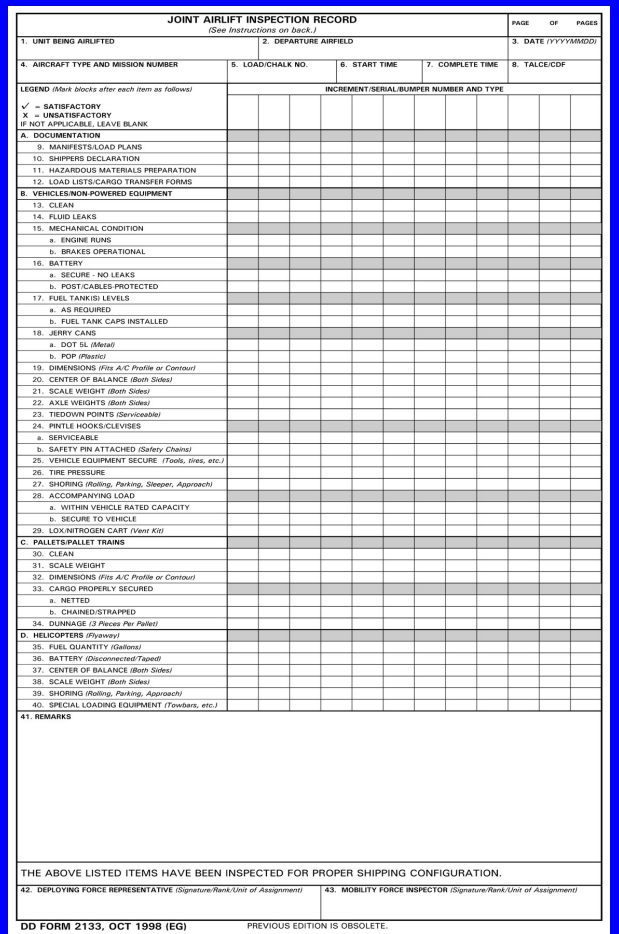
- **Joint**
  - Accomplish and document final joint inspections
  - Qualified representatives from the moving unit, DACG/MCC, and the supporting airlift representative will perform the inspection
  - The aircraft loadmaster or boom operator can conduct the final inspection

Joint Inspection Procedures

- Qualified Air Force and transported unit representatives will conduct final inspections
- The completed form will indicate inspections are complete
- No “Before Loading Inspection” is required by the aircrew; if all noted discrepancies are corrected before loading
- HAZMAT certifier for transported unit must be present during the inspection

Joint Inspection Form

- DD Form 2133 is used as the final joint inspection document (example form at FM 3-35.4, p.K-3)
- Three copies are completed for each aircraft load and signed by representatives of the transported force and the supporting airlift personnel
  - 1) Attach the original signed copy to the aircraft cargo manifest
  - 2) TALCE or MST/DACG/MCC will keep one copy for station
  - 3) Transported force will keep one copy



JOINT AIRLIFT INSPECTION RECORD
(See Instructions on back.)

PAGE OF PAGES

1. UNIT BEING AIRLIFTED	2. DEPARTURE AIRFIELD	3. DATE *(YYYYMMDD)*

4. AIRCRAFT TYPE AND MISSION NUMBER	5. LOAD/CHALK NO.	6. START TIME	7. COMPLETE TIME	8. TALCE/CDF

LEGEND *(Mark blocks after each item as follows)*	INCREMENT/SERIAL/BUMPER NUMBER AND TYPE
✓ = SATISFACTORY X = UNSATISFACTORY IF NOT APPLICABLE, LEAVE BLANK	
A. DOCUMENTATION	
9. MANIFESTS/LOAD PLANS	
10. SHIPPERS DECLARATION	
11. HAZARDOUS MATERIALS PREPARATION	
12. LOAD LISTS/CARGO TRANSFER FORMS	
B. VEHICLES/NON-POWERED EQUIPMENT	
13. CLEAN	
14. FLUID LEAKS	
15. MECHANICAL CONDITION	
a. ENGINE RUNS	
b. BRAKES OPERATIONAL	
16. BATTERY	
a. SECURE - NO LEAKS	
b. POST/CABLES-PROTECTED	
17. FUEL TANK(S) LEVELS	
a. AS REQUIRED	
b. FUEL TANK CAPS INSTALLED	
18. JERRY CANS	
a. DOT 5L *(Metal)*	
b. POP *(Plastic)*	
19. DIMENSIONS *(Fits A/C Profile or Contour)*	
20. CENTER OF BALANCE *(Both Sides)*	
21. SCALE WEIGHT *(Both Sides)*	
22. AXLE WEIGHTS *(Both Sides)*	
23. TIEDOWN POINTS *(Serviceable)*	
24. PINTLE HOOKS/CLEVISES	
a. SERVICEABLE	
b. SAFETY PIN ATTACHED *(Safety Chains)*	
25. VEHICLE EQUIPMENT SECURE *(Tools, tires, etc.)*	
26. TIRE PRESSURE	
27. SHORING *(Rolling, Parking, Sleeper, Approach)*	
28. ACCOMPANYING LOAD	
a. WITHIN VEHICLE RATED CAPACITY	
b. SECURE TO VEHICLE	
29. LOX/NITROGEN CART *(Vent Kit)*	
C. PALLETS/PALLET TRAINS	
30. CLEAN	
31. SCALE WEIGHT	
32. DIMENSIONS *(Fits A/C Profile or Contour)*	
33. CARGO PROPERLY SECURED	
a. NETTED	
b. CHAINED/STRAPPED	
34. DUNNAGE *(3 Pieces Per Pallet)*	
D. HELICOPTERS *(Flyaway)*	
35. FUEL QUANTITY *(Gallons)*	
36. BATTERY *(Disconnected/Taped)*	
37. CENTER OF BALANCE *(Both Sides)*	
38. SCALE WEIGHT *(Both Sides)*	
39. SHORING *(Rolling, Parking, Approach)*	
40. SPECIAL LOADING EQUIPMENT *(Towbars, etc.)*	

41. REMARKS

THE ABOVE LISTED ITEMS HAVE BEEN INSPECTED FOR PROPER SHIPPING CONFIGURATION.

42. DEPLOYING FORCE REPRESENTATIVE *(Signature/Rank/Unit of Assignment)*	43. MOBILITY FORCE INSPECTOR *(Signature/Rank/Unit of Assignment)*

DD FORM 2133, OCT 1998 (EG) PREVIOUS EDITION IS OBSOLETE.

General Guidelines

- Vehicles and equipment should be prepared so as not to diminish their combat capability. They should not be reduced greater than that required to meet the dimensional and weight restrictions of the aircraft transporting them.
- General cargo can be carried in or on any vehicle if the cargp can be properly secured and restrained.
- Supplies and equipment not transported as secondary loads should be palletized.
- Internal airlift/helicopter slingable units (ISU) are certified for air transportation. The keys to the containers must be available throughout the deployment process. Hazardous materials must be accessible at all times when containerized.
- 463L pallets are certified for airlift to a maximum of 10,000 pounds weight. There are various height restrictions, according to the pallet's position within the aircraft.

Ref: FM 3-35.4, p.K-1/2

DD Form 2133 (Joint Airlift Inspection Record)

- Use as a guide when preparing equipment and car

Ref: FM 3-35.4, p.K-3

DD Form 2133 - Heading

- Page ___ of ____ Pages
- 1. Unit Being Airlifted (numerical designation and geographic location of the deploying unit)
- 2. Departure Airfield
- 3. Date (YYYYMMDD) of inspection
- 4. Aircraft Type and Mission Number
- 5. Load/ Chalk Number
- 6. Start Time: of inspection (local)
- 7. Complete Time: of inspection (local) - load ready for movement
- 8. TALCE / CDF (Cargo Deployment Function) numerical designator

JOINT AIRLIFT INSPECTION RECORD *(See Instructions on back.)* 1005 | PAGE OF PAGES

1. UNIT BEING AIRLIFTED	2. DEPARTURE AIRFIELD	3. DATE *(YYYYMMDD)*
7th Trans Gp, Ft Eustis, VA	Langley AFB, VA	20030115

4. AIRCRAFT TYPE AND MISSION NUMBER	5. LOAD/CHALK NO.	6. START TIME	7. COMPLETE TIME	8. TALCE/CDF
C17 015/03	05/07	1005	1430	15 AMCS

Ref: FM 3-35.4, p.K-3

DD Form 2133 - Legend

✓ = Satisfactory

X = Unsatisfactory

If Not Applicable, Leave Bla

JOINT AIRLIFT INSPECTION RECORD
(See Instructions on back.)

PAGE OF PAGES

1. UNIT BEING AIRLIFTED | 2. DEPARTURE AIRFIELD | 3. DATE *(YYYYMMDD)*

4. AIRCRAFT TYPE AND MISSION NUMBER | 5. LOAD/CHALK NO. | 6. START TIME | 7. COMPLETE TIME | 8. TALCE/CDF

LEGEND *(Mark blocks after each item as follows)*
- **SATISFACTORY**
- **X UNSATISFACTORY**
- IF NOT APPLICABLE, LEAVE BLANK

INCREMENT/SERIAL/BUMPER NUMBER AND TYPE

A. DOCUMENTATION	
9. MANIFESTS/LOAD PLANS	
10. SHIPPERS DECLARATION	
11. HAZARDOUS MATERIALS PREPARATION	
12. LOAD LISTS/CARGO TRANSFER FORMS	
B. VEHICLES/NON-POWERED EQUIPMENT	
13. CLEAN	
14. FLUID LEAKS	
15. MECHANICAL CONDITION	
a. ENGINE RUNS	
b. BRAKES OPERATIONAL	
16. BATTERY	
a. SECURE - NO LEAKS	
b. POST/CABLES PROTECTED	
17. FUEL TANK(S) LEVELS	
a. AS REQUIRED	
b. FUEL TANK CAPS INSTALLED	
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DD FORM 2133, OCT 1998 (EG) PREVIOUS EDITION IS OBSOLETE.

DD Form 2133 - Increment/Serial/Bumper Type

- Each item has its own column
- TCN's (Transportation Control Numbers) will be used to identify each individual item

LEGEND *(Mark blocks after each item as follows)*	INCREMENT/SERIAL/BUMPER NUMBER AND TYPE											
✔ = SATISFACTORY X = UNSATISFACTORY IF NOT APPLICABLE, LEAVE BLANK												

DD Form 2133 - Section A: Documentation

- Item 9. Manifests/Loadplans
  - 7 for CONUS / 15 for OCONUS moves
  - Check for proper manifesting of the entire chalk, and check that the load plane scale weights match the manifest weights
  - Ensure the load is correctly sequenced (IAW manifest) and compiles with all aircraft loading and safety of flights limitations
- Item 10. Shipper's Declaration for Dangerous Goods
  - Check for proper preparation of all required hazardous material documentation and certification

Ref: FM 3-35.4, p.K-3

DD Form 2133 - Section A: Documentation (Cont)

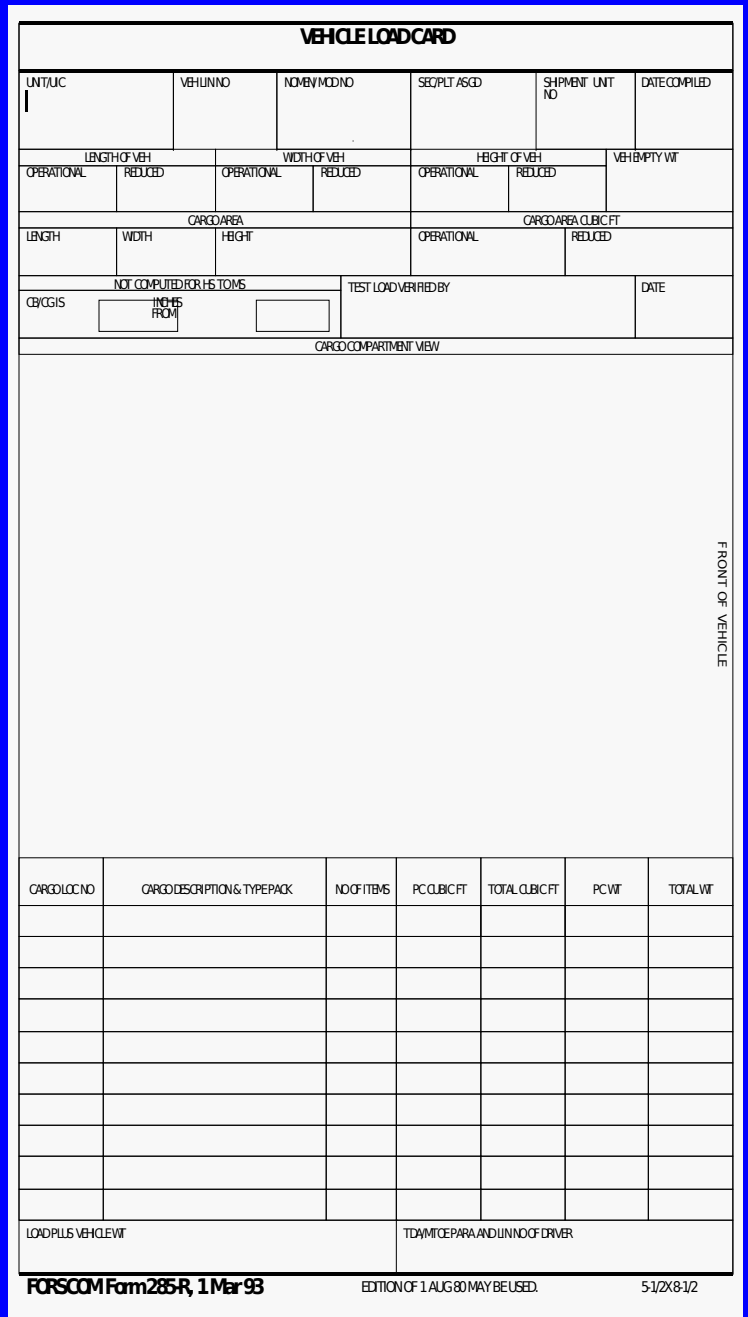
- Item 11. Hazardous Materials Preparation - check that all hazardous cargo in vehicles or as secondary loads is properly prepared, position and compatible with other hazardous material in the chalk as determined in TM 38-250

- Item 12. Load Lists / Cargo Transfer Forms: a list of items shipped must be included - ensure proper preparation of all required load lists and/or custodial transfer documentation

Ref: FM 3-35.4, p.K-4

DD Form 2133 - Section A: Documentation (Cont)

- Maintain a Vehicle Load Card (FORSCOM Form 285-R or DA Form 5748-R) for each cargo-carrying vehicle



VEHICLE LOAD CARD

UNIT/UIC	VEH LIN NO	NOMEN/MOD NO	SEC/PLT ASGD	SHIPMENT UNIT NO	DATE COMPILED

LENGTH OF VEH		WIDTH OF VEH		HEIGHT OF VEH		VEH EMPTY WT
OPERATIONAL	REDUCED	OPERATIONAL	REDUCED	OPERATIONAL	REDUCED	

CARGO AREA			CARGO AREA CUBIC FT	
LENGTH	WIDTH	HEIGHT	OPERATIONAL	REDUCED

NOT COMPUTED FOR HS TOMS				
CB/CG IS	INCHES FROM		TEST LOAD VERIFIED BY	DATE

CARGO COMPARTMENT VIEW

FRONT OF VEHICLE

CARGO LOC NO	CARGO DESCRIPTION & TYPE PACK	NO OF ITEMS	PC CUBIC FT	TOTAL CUBIC FT	PC WT	TOTAL WT

LOAD PLUS VEH CLE WT	TDA/MTOE PARA AND LIN NO OF DRIVER

FORSCOM Form 285-R, 1 Mar 93 EDITION OF 1 AUG 80 MAY BE USED. 5-1/2X8-1/2

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment

- Item 13: Clean
  - No dirt, trash or pests
  - Clean each item of grime, oil, dirt etc
  - Stream clean if necessary
  - Clean all vehicle tires of rocks/pebbles embedded in the treads

Ref: FM 3-35.4, p.K-4

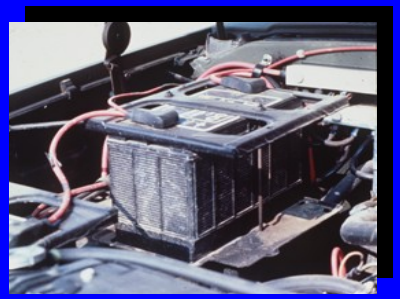
DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 14: Fluid Leaks
  - Five drops or more per minute from a cooling system, crank case, or gear case is a leak - NO GO
  - Fuel or brake system leaks, no matter how minor, will prevent air shipment - NO GO
  - Do not consider a damp or discolored seal a leak unless any of the above conditions exist

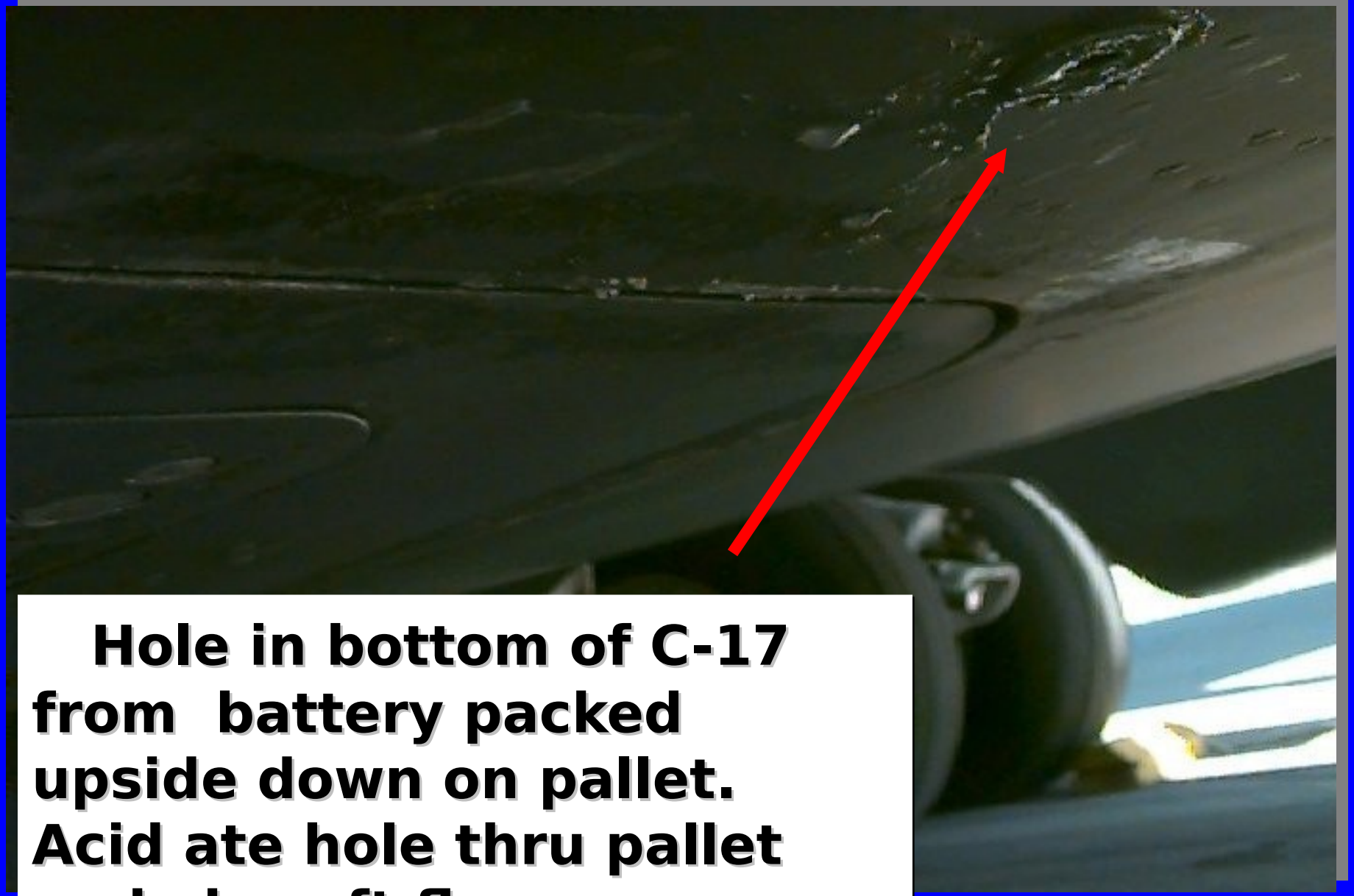
Ref: FM 3-35.4, p.K-4

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 15: Mechanical Condition
  - 15A - Engine Runs: Unless a vehicle is shipped as retrograde cargo it must be operational
  - 15B - Brakes Operational: Check that engine brakes and emergency brakes operate
- Item 16: Battery
  - 16A - Secure no leaks: Ensure battery is correctly installed. Ensure holding clamp is secure, filler caps tightly installed. Battery connectors are tight and all cables/clamps are not in contact with any grounding point during loading or flight
  - 16B - Post/Cables-Protected: To secure the battery from short circuit, completely protect the terminal posts from contact (disconnect if necessary)
  - If disconnected ensure terminals are covered with rubber covers or tape to prevent damage and short circuits



Ref: FM 3-35.4, p.K-4



Hole in bottom of C-17 from battery packed upside down on pallet. Acid ate hole thru pallet and aircraft floor

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 17: Fuel Tank (s) Levels
  - Vehicles and self-propelled units will not exceed ¾ of a tank when positioned on the cargo floor or ½ a tank when positioned on the cargo ramp of the C-130, C-141, C-17, and C-5
  - Vehicles and self-propelled units may be filled with fuel not to exceed ½ full when loaded on the KC-10 and the KC-135
  - Equipment that is ramp loaded will be positioned with the gas tank opening on the high side of the ramp
  - Wheeled engine-powered support equipment (such as wheeled generators) will not exceed ½ tank regardless of aircraft or position on the aircraft
  - Palletized vehicles or self-propelled equipment will not exceed ½ of a tank. Palletized generators will be drained

Ref: FM 3-35.4, p.K-4

Fuel Tank Levels (cont)


C-130


C-141B


C-17


C-5

Vehicles and self-propelled units: 3/4 full on cargo floor/ 1/2


KC-10


KC-135

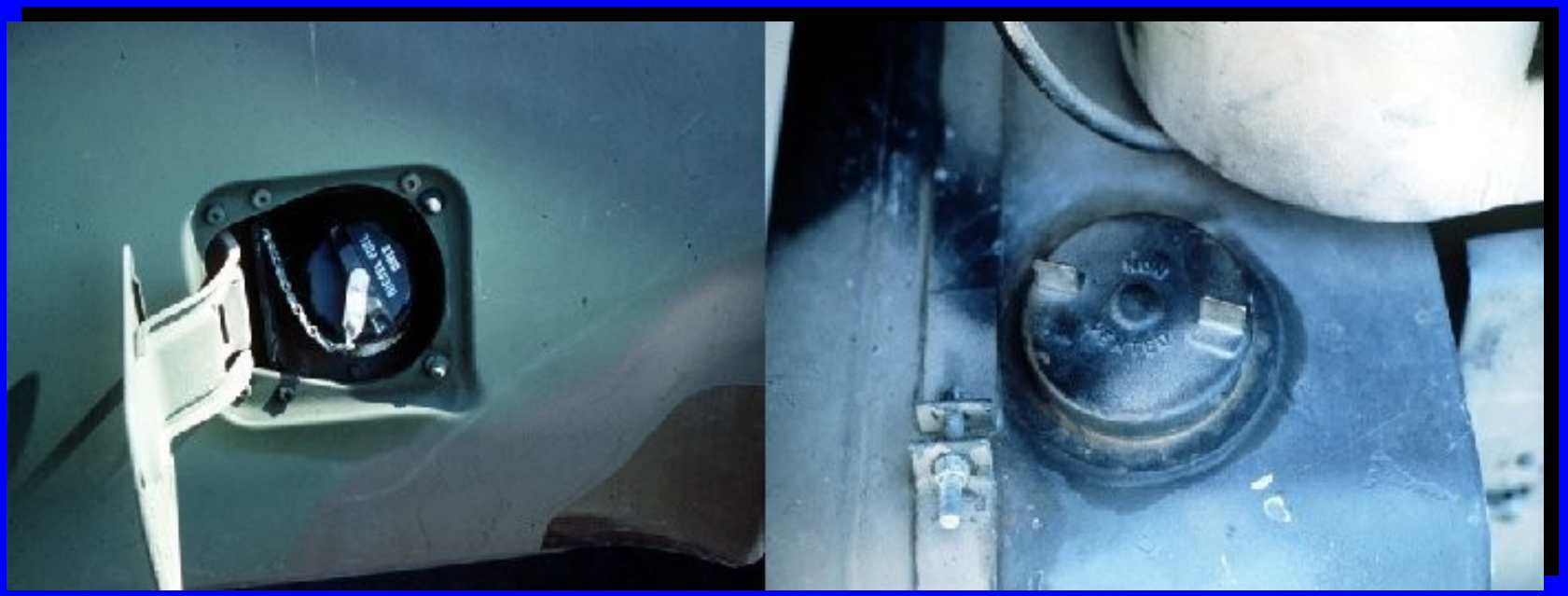
Vehicles and self propelled units: 1/2 full anywhere on a

Fuel Levels (cont)

- Single axle units disconnected from its prime mover and loaded with its tongue resting on the aircraft floor or ramp must be drained, but need not be purged (up to 500 ml [17 ounces] of fuel may be left in engine components and fuel lines)

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 17b - Fuel Tank(s) Caps Installed



Ref: FM 3-35.4, p.K-4

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 18: Jerrycans
  - 18A: DOT 5L (Metal)
    - Authorized for transporting flammable liquid fuel stocks
    - Combined with fuel shipped in vehicle tanks do not exceed two full tanks supply
    - Must be secured in approved storage racks designed to prevent movement or leakage during airlift
    - Must be serviceable - ie serviceable gasket in place on the screw gap closure, no leakage or dents in seams
    - Can only be palletized when drained (purging not required)
    - No minimum fuel requirement - 5 gallons maximum (measured to the weld bead near the top of the can)

Ref: FM 3-35.4, p.K-4

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 18: Jerrycans
  - 18B: POP (Performance Oriented Packaging) - plastic
    - Same as for DOT 5L (Metal) except these containers may be palletized with hazardous material inside and a 2% ullage must be maintained to prevent expansion and leakage when filling this container

POP
Plastic

DOT 5L
Metal

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment - Tankers

- No tanker type vehicle is certified to be air-lifted full, with the exception of the M-149A2 water buffalo (only when potable water not readily available at destination)
- Diesel tankers will be drained
- Mogas tankers will be drained and purged

Ref: FM 3-35.4, p.K-1

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 19 - Dimensions
  - Ensure equipment will negotiate the aircraft ramps and interior dimensions (will not come into contact with the aircraft sidewalls or ceiling at any time)

Ref: FM 3-35.4, p.K-5

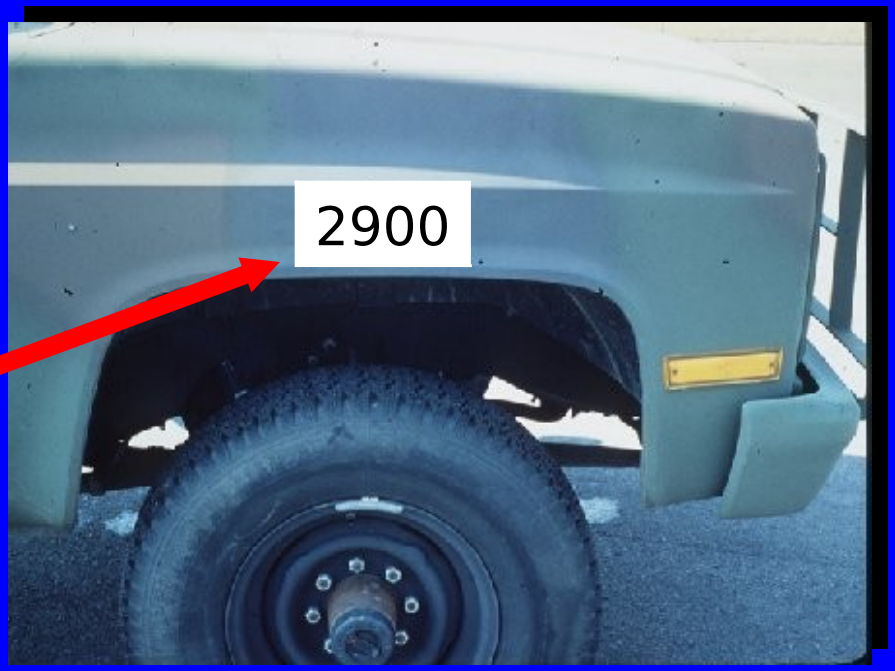
DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 20 - Center of Balance - to nearest whole inch (Marked on both sides of vehicle)
- Item 21 - Scale/Gross Weight - to nearest whole pound (Marked on both sides of vehicle)

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

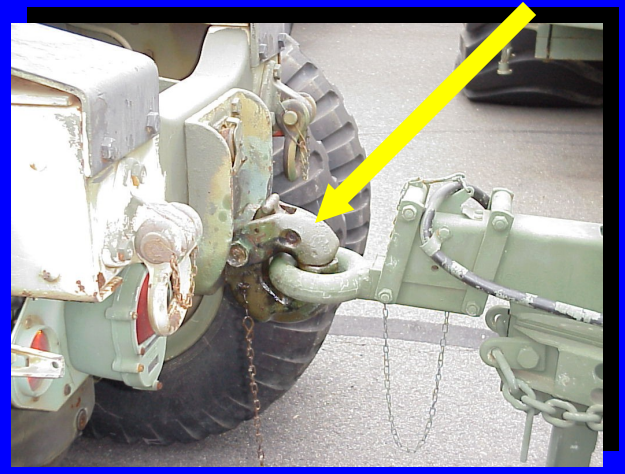
- Item 22 - Axle Weights (Marked on both sides of vehicle)
  - Mark axle weights above each axle



Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

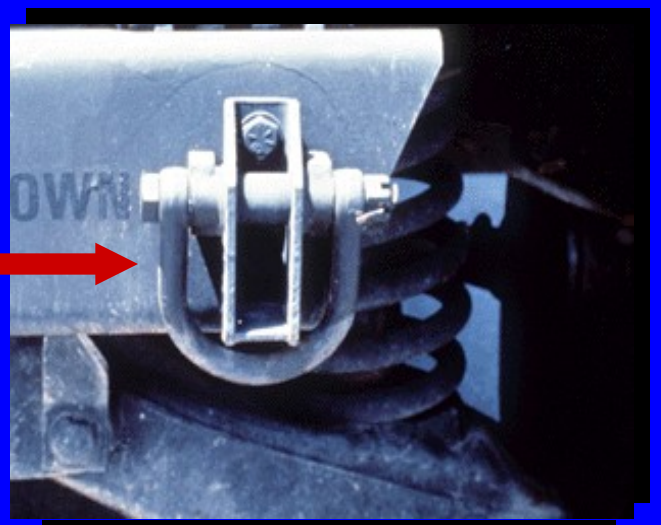
- Item 23 – Tiedown Points *(Serviceable)*
  - Ensure all clevises and tie down points are serviceable
  - Include interior and exterior cargo restraint tiedowns in the inspection

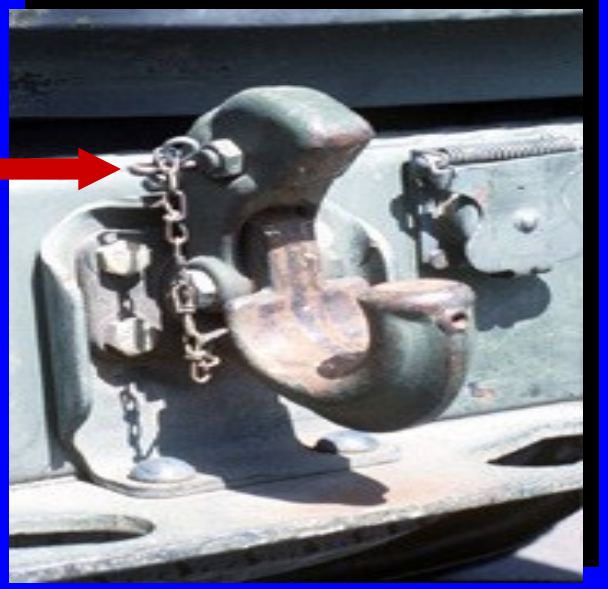


Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 24 - Pintle Hooks/Clevises
  - Item 24a – Serviceable (ensure all devices required for loading/off-loading trailers and cargo are serviceable)
  - Item 24b - Safety Pin Attached (Ensure all required pins or cotter keys are properly attached and serviceable)





Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 25 - Vehicle Equipment Secured: Ensure all vehicle accessories are secure, including fire extinguishers, seat brackets, and any other loose equipment that may become a projectile during flight

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 26 - Tire Pressure - ensure within manufacturer specifications (Max 100 psi). Tires must be sufficiently inflated to prevent wheel-rim contact with the aircraft floor. Note that tires are not to be deflated to aid in clearance for loading on board aircraft

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

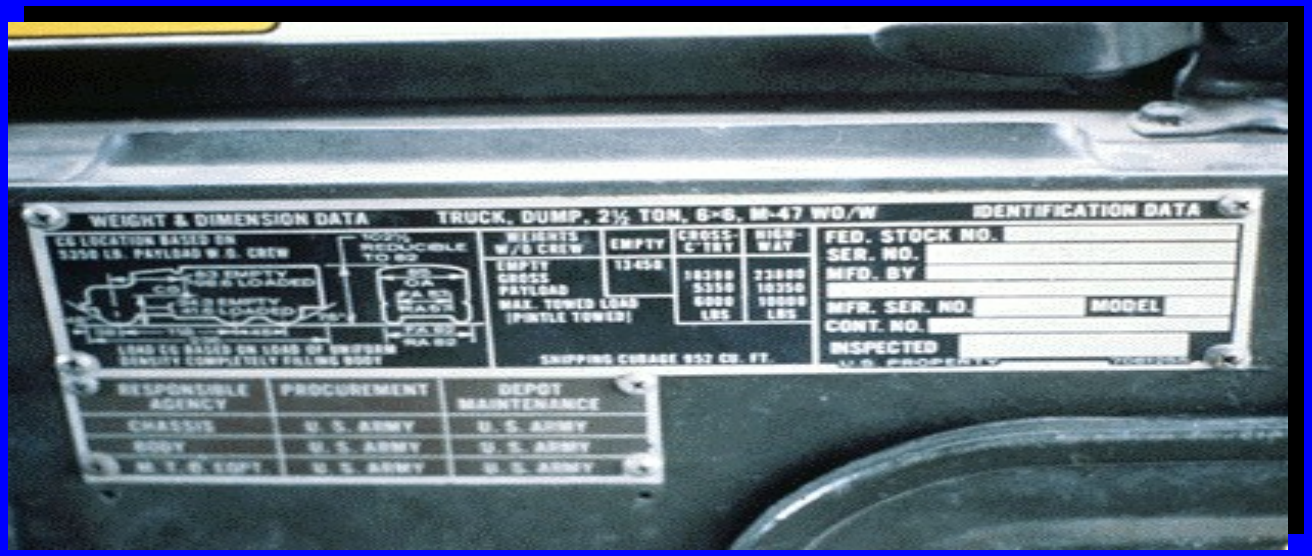
- Item 27 - Shoring (Rolling, Parking, Sleeper, Special, Approach)
  - Check that all required shoring is serviceable and immediately available for use
  - Ensure shoring is adequate for the intended task (consult aircraft loading manual)

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 28 - Accompanying Load

- Item 28a - Within Vehicle
- Rated Capacity (do not exceed cross-country capacity) - see vehicle data plate



Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 28b - Secure To Vehicle
- Ensure cargo is properly restrained and within the loading criteria for the vehicle (generally not to exceed sidewall height)
- Use a minimum of 1/2 inch diameter rope (not nylon - it stretches) for cargo restraint. 463L aircraft tiedown equipment may also be used
- Ensure rope touches cargo not just side racks
- Consider all locally manufactured modifications as secondary loads

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- Item 29 - LOX/Nitrogen Cart
  - Ensure appropriate vent kit materials are with the cart
  - Ensure a technician is available at loading to install vent

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section C: Pallets/Pallets Trains

DD Form 2133 - Section C: Pallets/Pallets Trains

- Item 30 – Clean: clean each piece of end piece or equipment of all grime, oil, dirt etc - steam clean if necessary. Ensure no soil is transported on or under items loaded on the pallet
- Item 31 – Pallet Scale Weight (to the nearest pound): attached to one 88-inch side and one 108-inch side of the pallet
- Item 32 – Dimensions: Check that each pallet does not exceed the dimensions of the planned aircraft position (vary among aircraft and among pallet positions on a specified aircraft) - eg Pallet Position 1 on a C-141B may not exceed 76 inches in height

Ref: FM 3-35.4, p.K-5

DD Form 2133 - Section C: Pallets/Pallets Trains (cont)

- Item 33 - Cargo Properly Secured
  - Item 33a - Netted (nets serviceable and properly installed)
  - Item 33b - Chained/Strapped (serviceable and properly installed and provide adequate restraint)

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section C: Pallets/Pallets Trains (cont)

- Item 34 - Dunnage *(3 Pieces Per Pallet)*
  - Ensure three x 4”x 4” x 88” pieces accompany each pallet during shipment

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway)

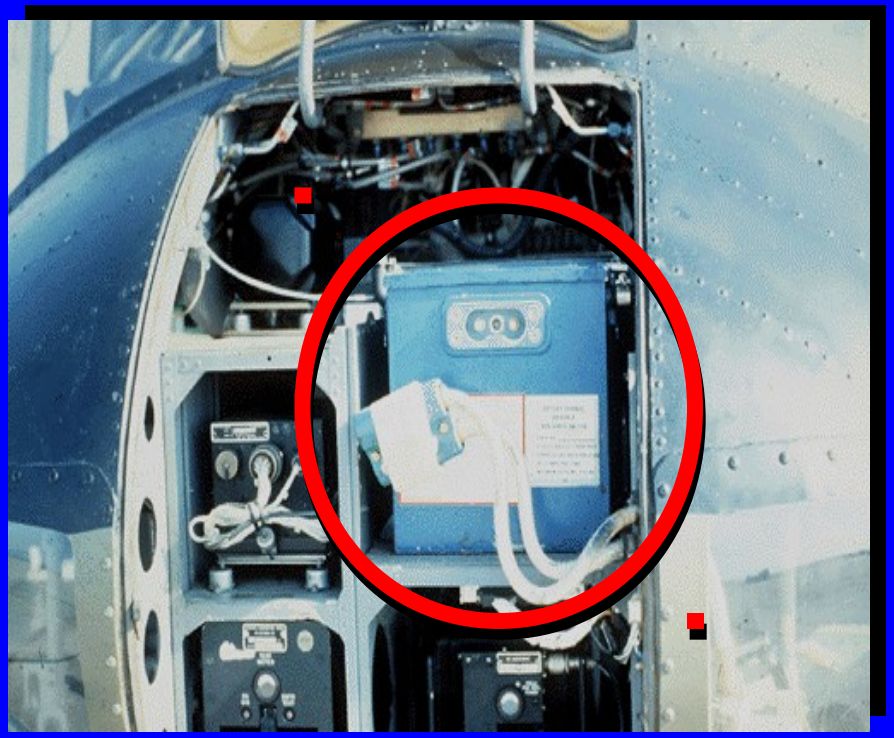
DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

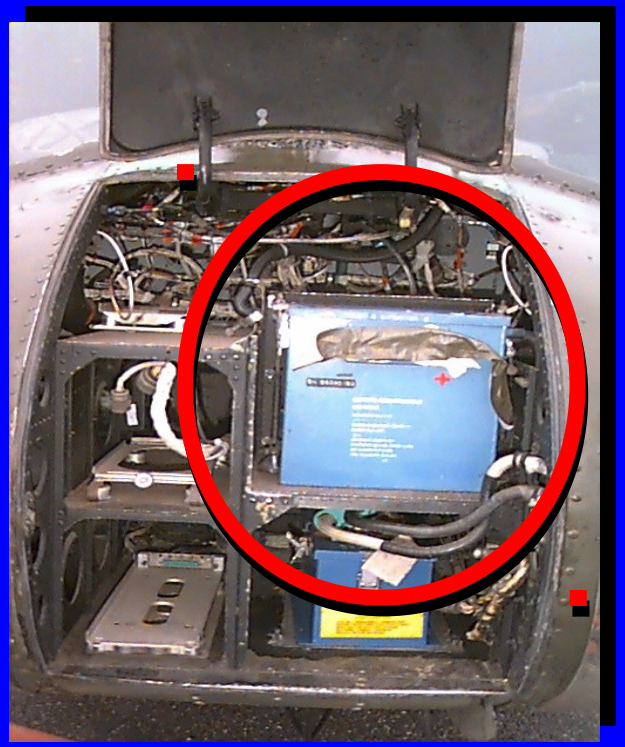
- Item 35 – Fuel Quantity *(Gallons)*
  - Do not exceed ¾ full or 150 gallons per tank whichever is less

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- Item 36 – Battery: Ensure user disconnects and tapes battery terminal and secures the battery to prevent accidental leaks and short circuits





Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- Item 37 – CB
  - Ensure user clearly marks the CB on both sides of the item
- Item 38 - Scale/Gross Weight (Clearly marked on both sides)

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- Item 39 - Shoring *(Rolling, Parking, Approach)*
  - Check that all required shoring is serviceable and immediately available for use
  - Ensure adequate shoring is available to decrease the ramp angle to keep the helicopter from striking the ground or the aircraft

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

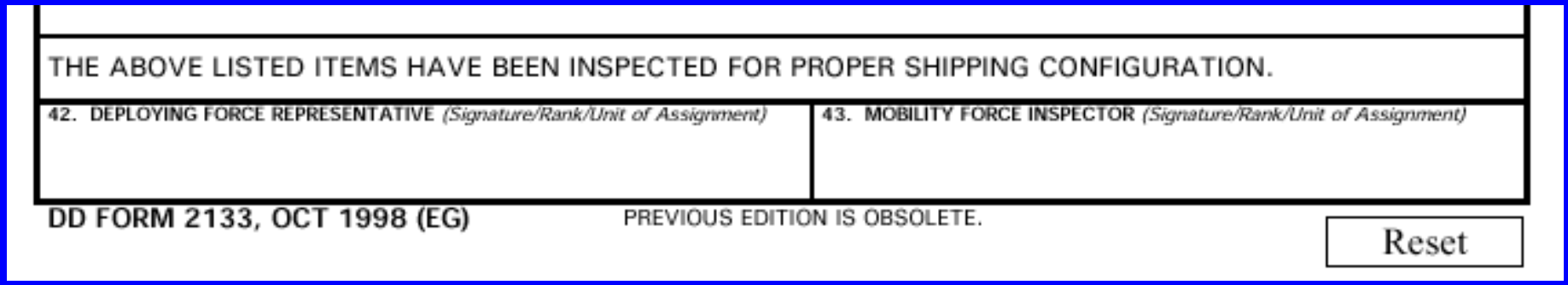
- Item 40 - Special Loading Equipment
  - Be sure special equipment necessary to load this cargo is available (tools, jacks, pintle hooks, ramps, towbars etc)

- Item 41 - Remarks
  - List and explain, in detail, any discrepancies found during the inspection and actions taken to correct the problem

Ref: FM 3-35.4, p.K-6

DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- Item 42 - Deploying Force Representative
  - Signed by the deploying unit representative accompanying the mobility force inspector
- Item 43 - Mobility Force Representative
  - Signed by the TALCE representative conducting the inspection



THE ABOVE LISTED ITEMS HAVE BEEN INSPECTED FOR PROPER SHIPPING CONFIGURATION.

42. DEPLOYING FORCE REPRESENTATIVE *(Signature/Rank/Unit of Assignment)*	43. MOBILITY FORCE INSPECTOR *(Signature/Rank/Unit of Assignment)*

DD FORM 2133, OCT 1998 (EG) PREVIOUS EDITION IS OBSOLETE.

Reset

Ref: FM 3-35.4, p.K-6

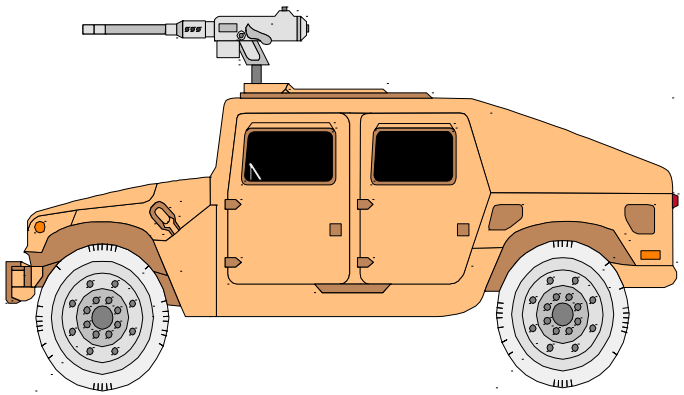
DETERMINE CENTER OF BALANC

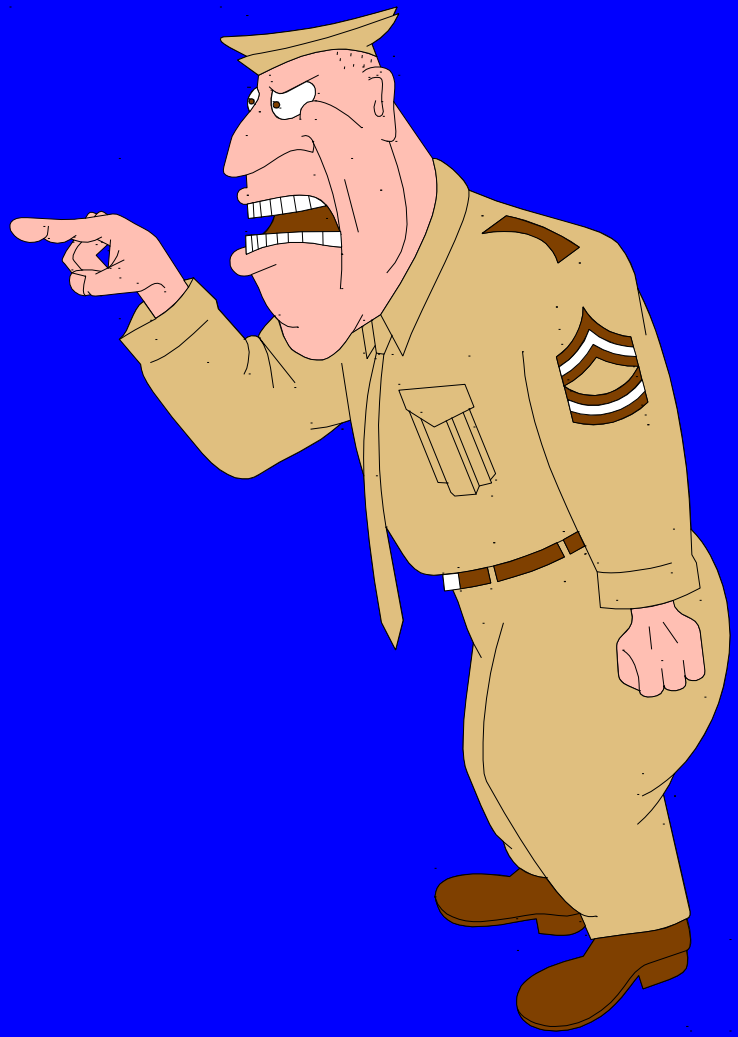
D1 = 20

D2 = 150

W1 = 2,870

W2 = 2,550





Determine Center of Balance

- Each aircraft has a Center of Balance (CB or C/B) safety range
- The unit's aircraft cargo must fall within the aircraft safety range
- The term CB refers to the balance point of items of cargo or equipment that go into the aircraft

Determine Center of Balance (cont)

- Determine center of balance of a vehicle after all secondary loads are secure
  - No items should be added or removed from a vehicle that has been weighed and the CB calculated. If changes are made, the vehicle must be weighed again and the CB recalculated
- Do not use data plate weight (s) in lieu of weighing


CARGO WEIGHING

- All cargo offered for shipment must be weighed
  - Portable or fixed scales
  - Indicate actual weight on both sides of items offered for shipment
  - Scale weight must be recorded on all copies of the manifest
- Accuracy of weights
  - Don’t weigh cargo until secondary load is secured
  - Don’t add or remove cargo
  - Any additions/deletions require cargo to be weighed again


TYPES OF SCALES

- Fixed Scales
  - Permanently installed weighing devices
  - These scales are capable of weighing most items of cargo
  - Located at most major military installations

- Portable scales
  - Most commonly used have a capacity of 20,000 lbs per scale
  - Normally used in multiples of four (minimum is two)
  - Used extensively at airfields, marshaling areas and inspection areas

SING PORTABLE SCALES - VEHICL

- When only two portable scales are available:
  - Place the scales in front of the tires of the first axle
  - Drive the vehicle onto the scales; keep tires centered on the scales
  - Determine the axle weight - note each scale weight (right and left side) must be combined to obtain the axle weight
  - Continue process until all axles are weighed
- The driver and/or passen
vehicle prior to weighing

USING PORTABLE SCALES - PALLET

- Weighing pallets
  - Each 463L pallet must be weighed
  - Scale weights must be recorded on all copies of the manifest
  - Place a loaded pallet evenly on two portable scales (three pieces of dunnage must be weighed with the pallet)
  - Add the two scale weights together to get the pallet gross weight
  - Ensure the scale weight is is clearly marked on one 88-inch side and one 108-inch side of the pallet

Wheeled Vehicle Measurement

Center of Balance Terminology

- CB - CENTER OF BALANCE - the point of balance of a piece of cargo
- FAW = FRONT/FORWARD AXLE WEIGHT (pounds)
- IAW = INTERMEDIATE AXLE WEIGHT (pounds)
- RAW= REAR AXLE WEIGHT (pounds)
- GW = GROSS WEIGHT (pounds) (the total weight of an item of cargo, including all secondary loads - found by adding all individual axle weights together)
- RDL = REFERENCE DATUM LINE (point from which all measurements are taken - normally the forward edge of a vehicle).
- MOMENT Product (inch-pounds) obtained by multiplying the weight (axle) by a distance (inches)

Center of Balance Terminology (cont)

- FOH = FRONT OVERHANG (Distance in inches from front edge [bumper] to center of front axle)

- WB = WHEEL BASE (Distance in inches from center of front axle to center of rear axle or center of tandem axles)

- FFE = FROM FORWARD EDGE (Distance in inches from the most forward edge of a vehicle to its CB)

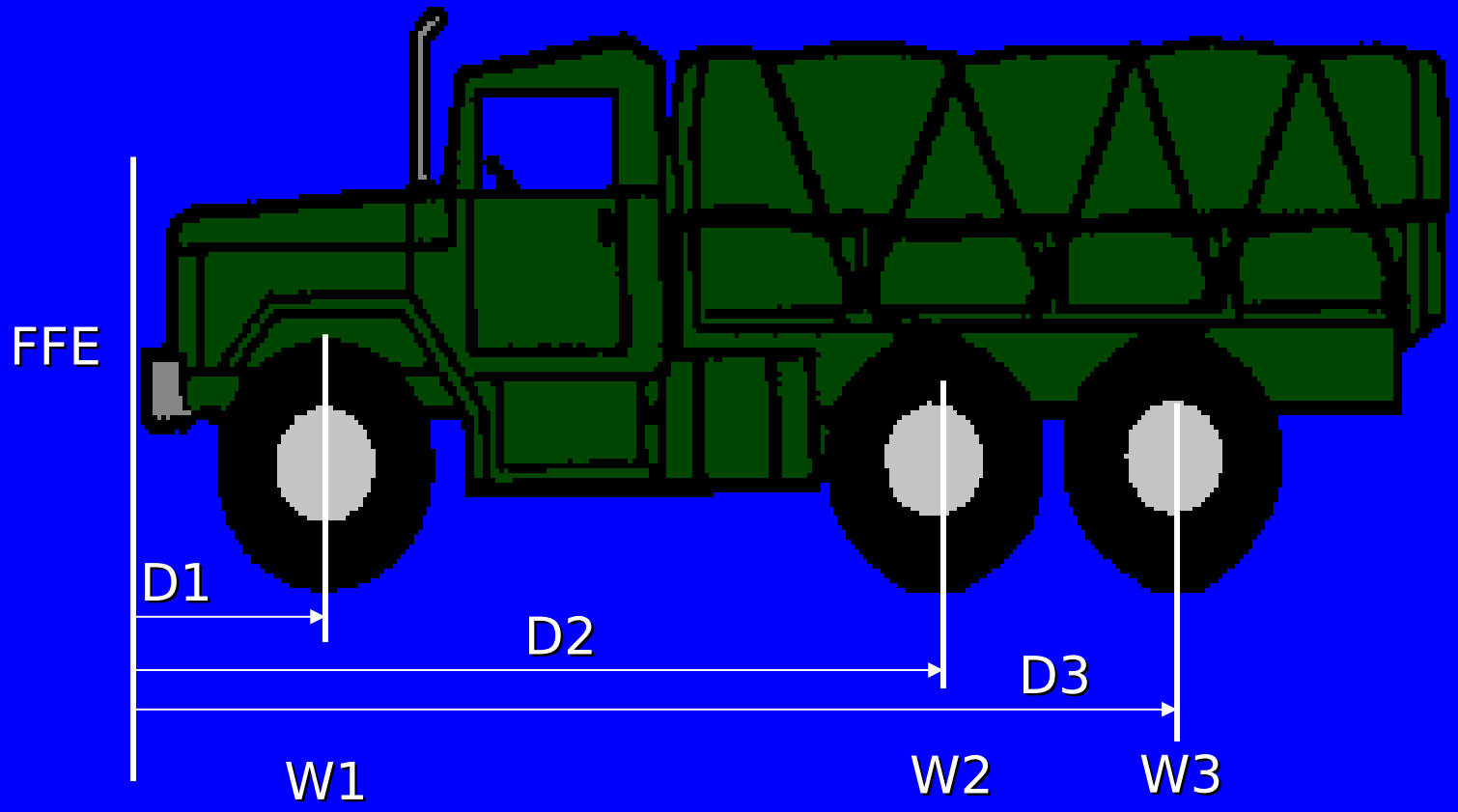
Center of Balance Criteria

- Center of balance markings are not required on individual 463L pallets (if built correctly CB will be at or near the center - however, CB marking required for married pallets [pallet train])
- Mark the CB on all items of cargo that meet the following criteria
  - All vehicles
  - Any items of cargo 10 feet or longer
  - Any item with a CB point other than its center

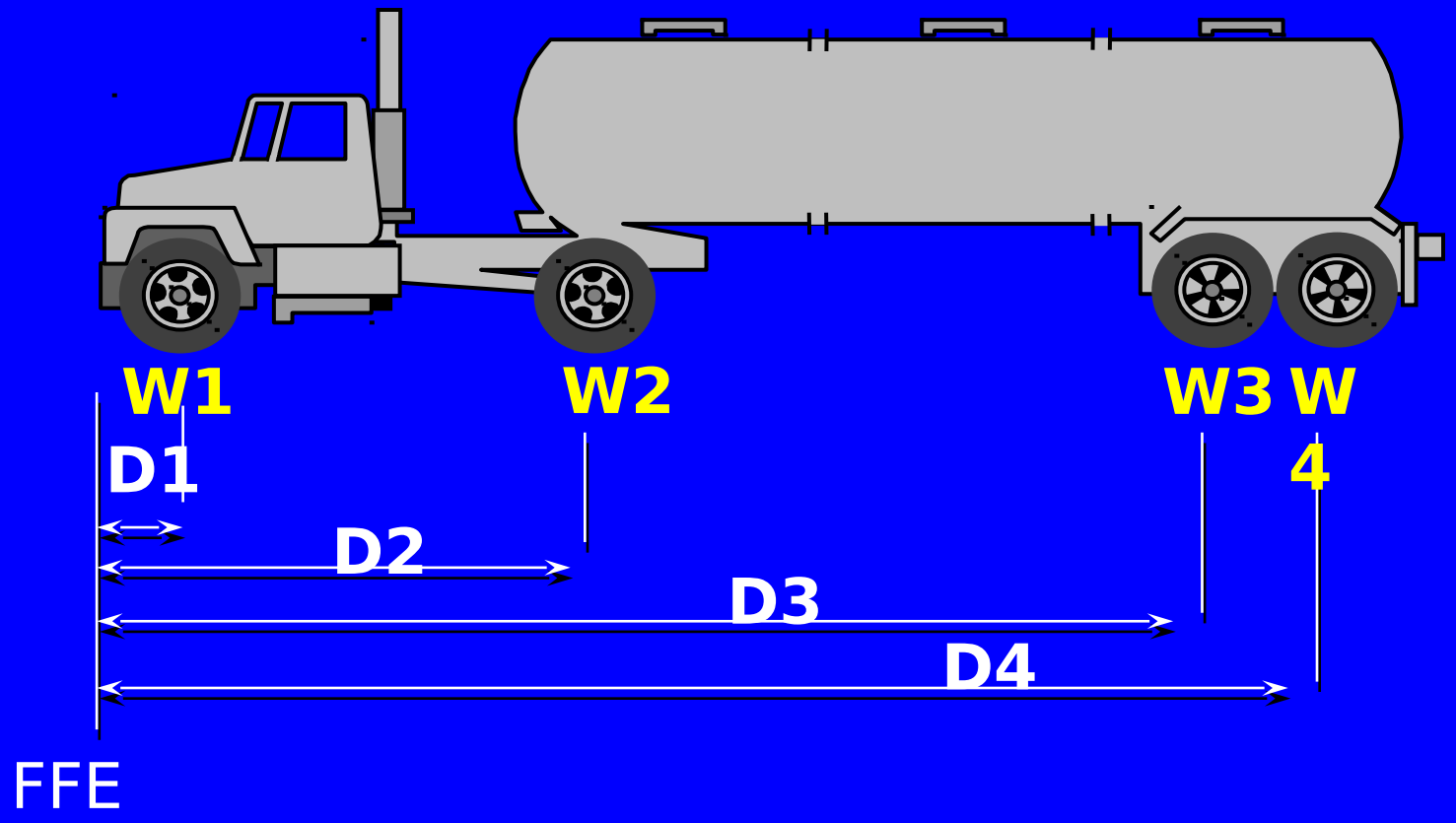
CENTER OF BALANCE OF WHEELED VEHICLES

Wheeled Vehicles CB

- Determine distance from front forward edge (FFE) to the middle of the front, intermediate & rear axles



Wheeled Vehicles CB (cont)



Wheeled Vehicles CB (cont)

- Only vehicles that require a combined CB are those tractor-trailers that will remain coupled during flight

Ref: FM 3-35.4, p.K-5

Wheeled Vehicles CB (cont)

W1= Front axle weight in pounds
W2 = Intermediate axle weight
W3= Rear axle weight
D1= Distance in inches, from FFE to Front axle
D2= Distance from FFE to Intermediate axle
D3= Distance from FFE to Rear axle
Gross Weight = Sum of W1, W2, W3 etc (sum of all axle weights)

$$CB = \frac{(W1 \times D1) + (W2 \times D2) + (W3 \times D3)}{\text{gross weight}}$$

Wheeled Vehicles CB (cont)

W1= 5,000 lbs

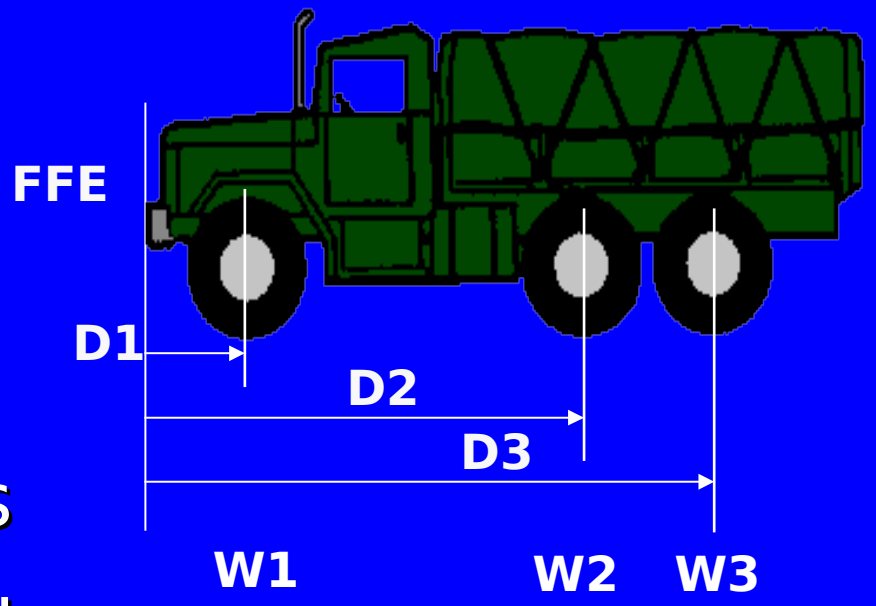
W2 = 5,000 lbs

W3 = 5,000 lbs

D1 = 35 inches

D2 = 131 inches

D3 = 177 inches



Wheeled Vehicles CB (cont)

$$CB = \frac{(W1 \times D1) + (W2 \times D2) + (W3 \times D3)}{GW}$$

$$CB = \frac{(5{,}000 \times 35) + (5{,}000 \times 131) + (5{,}000 \times 177)}{15{,}000}$$

$$CB = \frac{175{,}000 + 655{,}000 + 885{,}000}{15{,}000}$$

$$1{,}715{,}000 \div 15{,}000$$

CB = 114.33 or 114 inches (rounded to nearest inch)

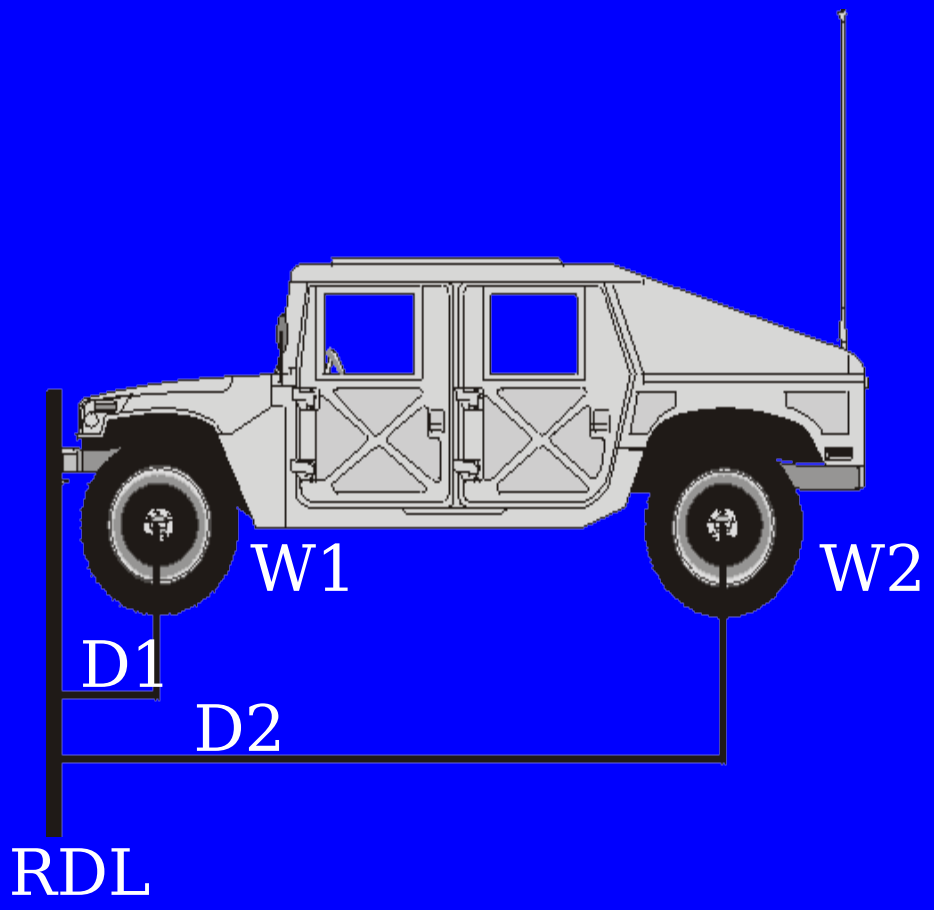
Sample Problem 1

D1 = 20

D2 = 150

W1 = 2,870

W2 = 2,550



Sample Problem 2

D1 = 70

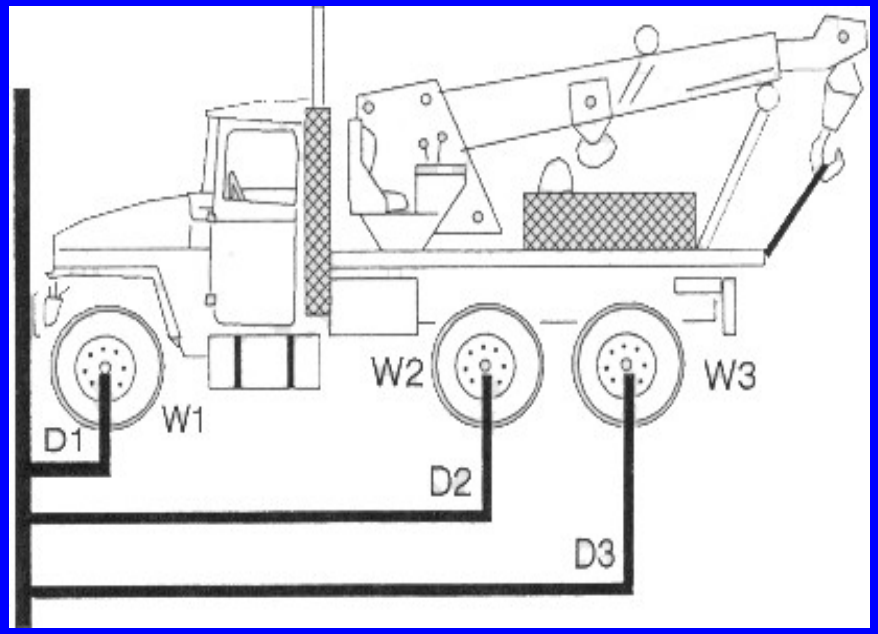
D2 = 222

D3 = 276

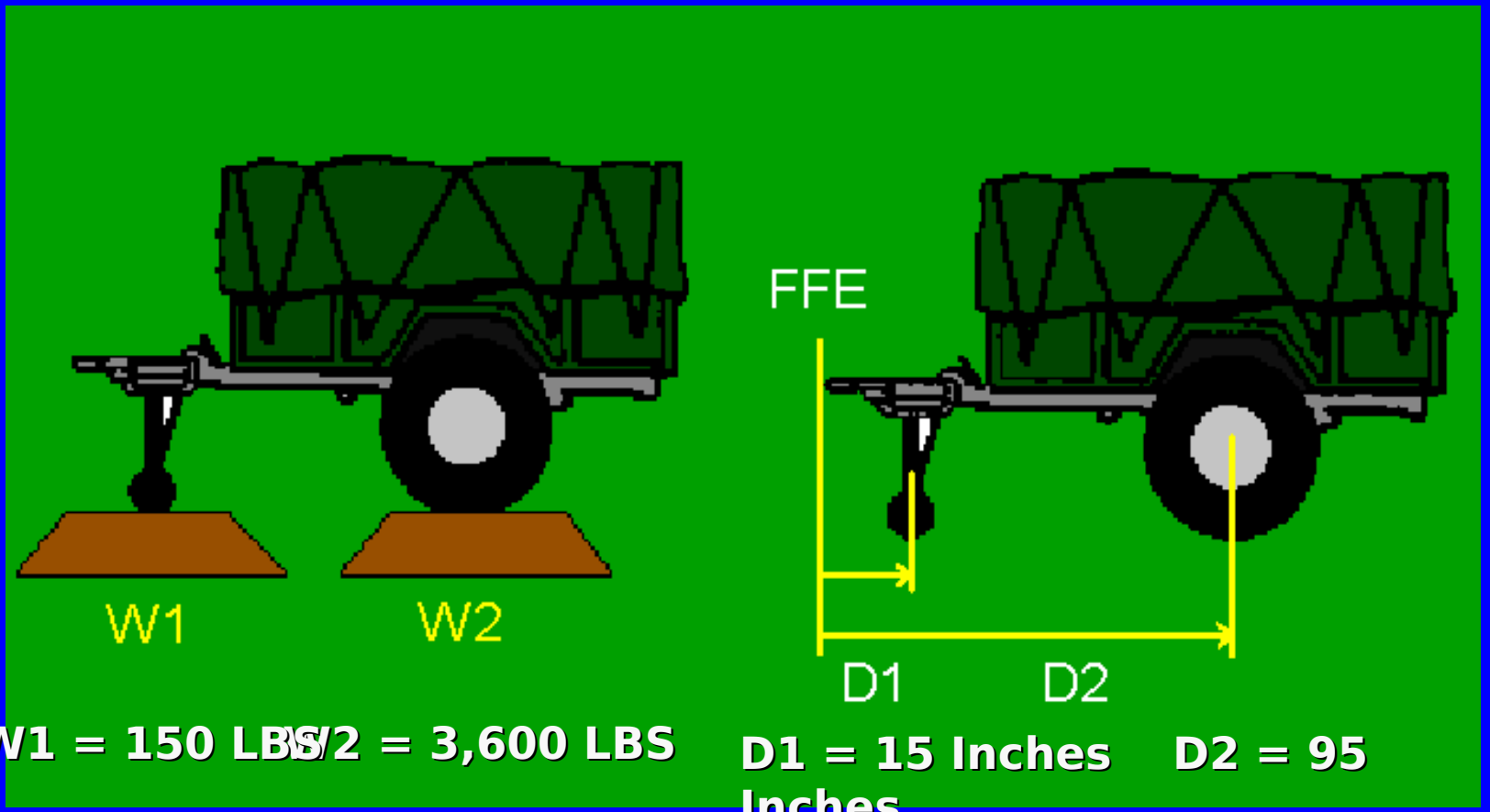
W1 = 12,500

W2 = 12,900

W3 = 12,700



Trailer CB



W1 = 150 LBS W2 = 3,600 LBS

D1 = 15 Inches D2 = 95 Inches

Trailer CB (cont)

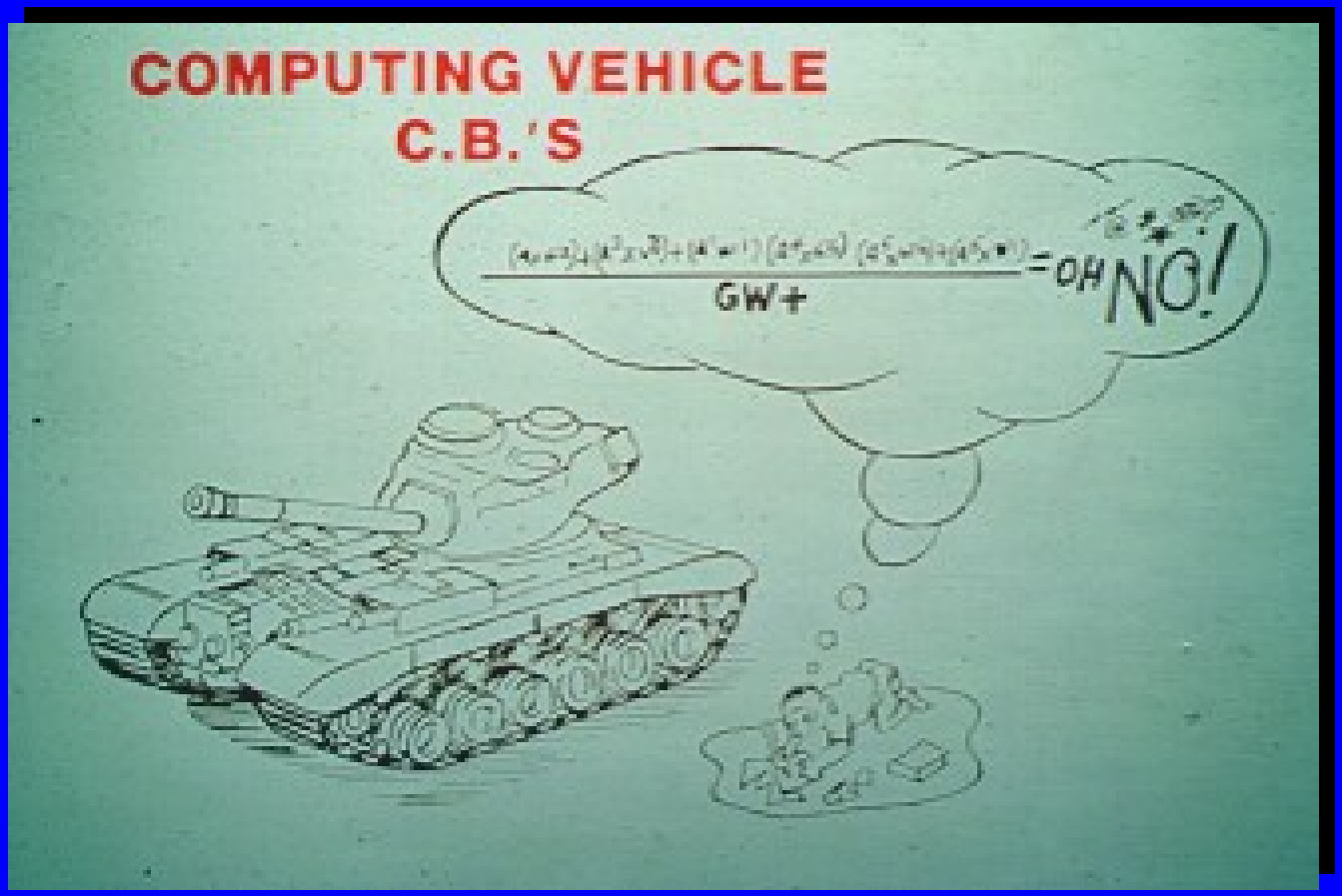
$$CB = \frac{(W1 \times D1) + (W2 \times D2)}{GW}$$

$$CB = \frac{(150 \times 15) + (3{,}600 \times 95)}{3{,}750}$$

$$CB = \frac{2250 + 342{,}000}{3{,}750}$$

CB = 91.8 or 92 Inches

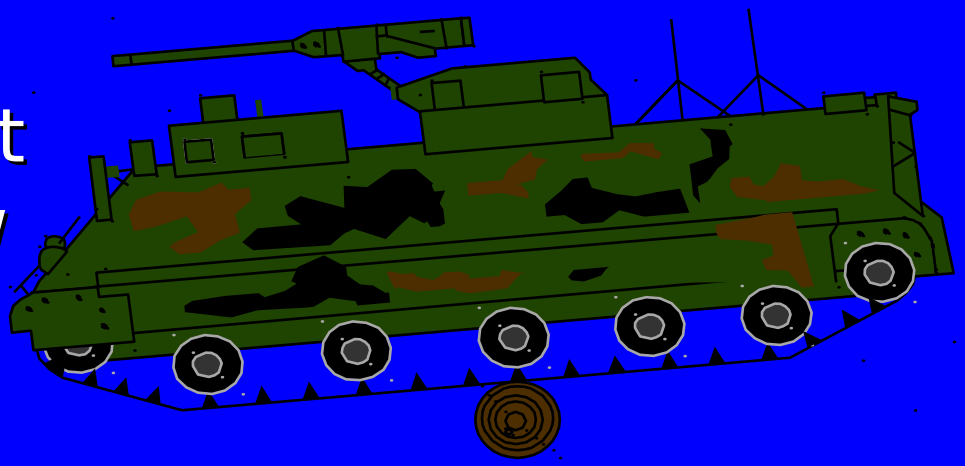
Tracked Vehicles CB



How do you determine the individual axle weigh

Tracked Vehicles CB (cont)

- To determine the center of balance for a tracked vehicle, drive the vehicle over an object large enough to allow the vehicle to teeter

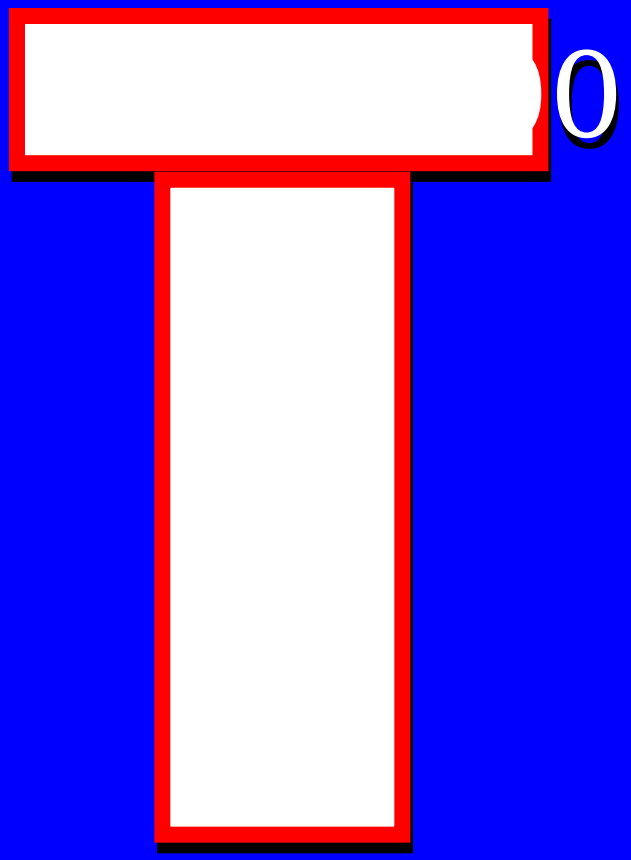


- The location of where the vehicle teeters will be marked as the center of balance


'94 1 2

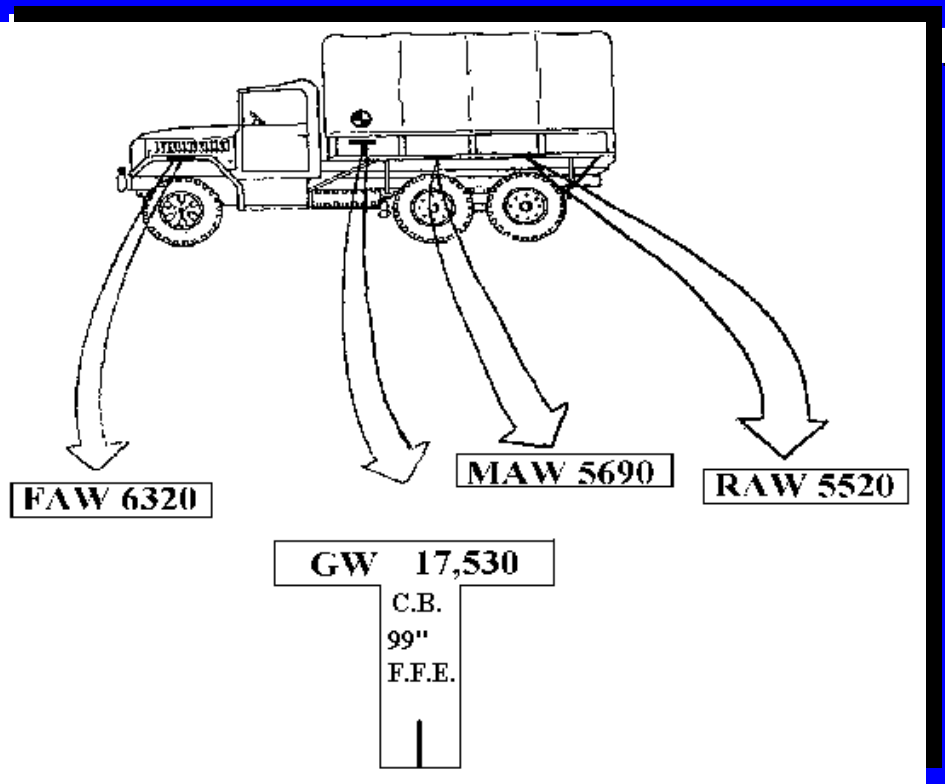
Center of Balance Marking

- After computing the CB of the vehicle:
  - Mark its location and gross weight on both sides of the vehicle
  - Using weather resistant masking tape and grease pencil/magic marker, forming the letter “T”



Center of Balance Marking (cont)

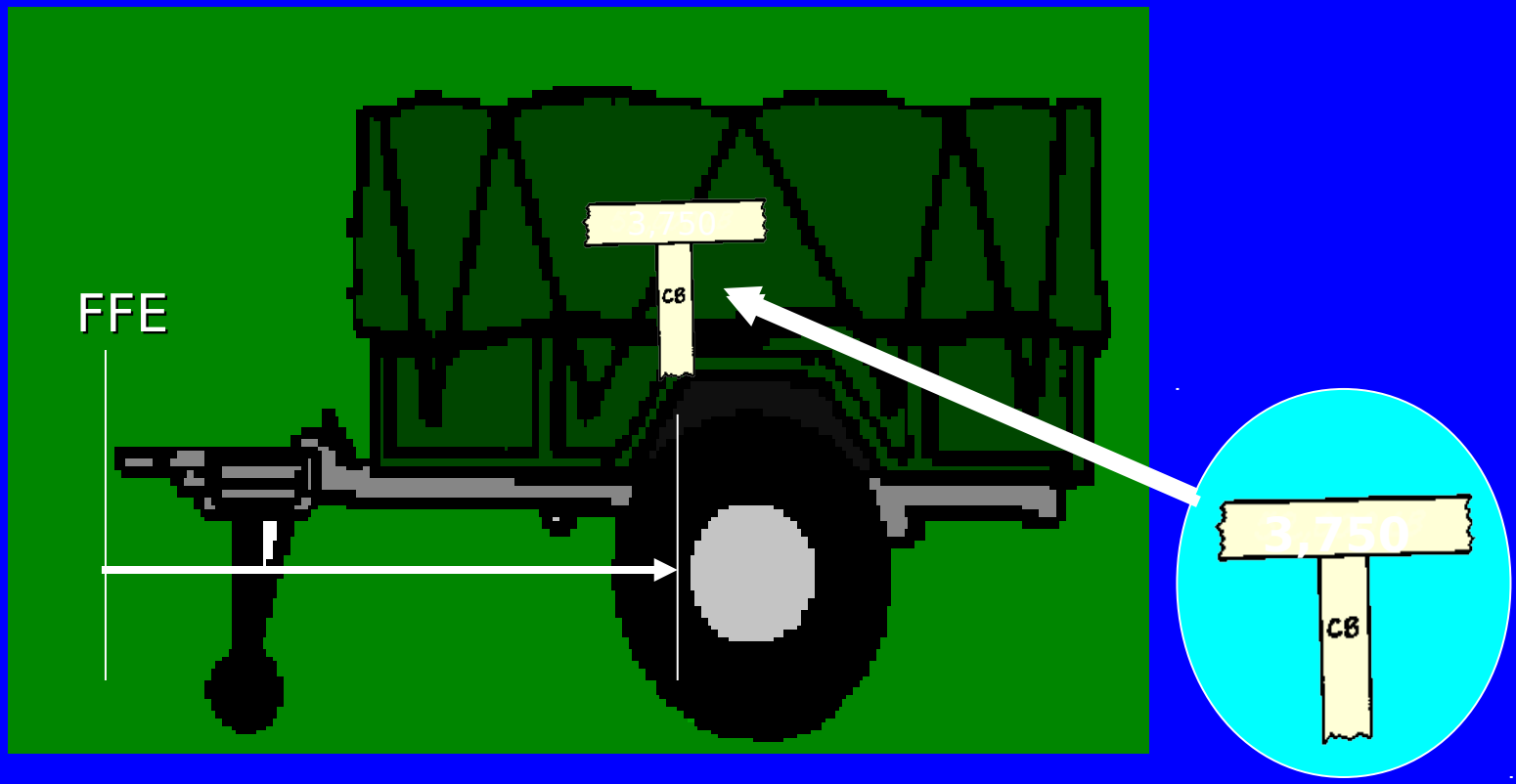
- "T" marking
  - The horizontal portion of the "T" will contain the gross weight
  - The vertical portion indicates the exact position of CB (indicated by the letter 'CB'
  - Indicate number of inches from the RDL to the CB location and mark ax n both sides of the veh



Center of Balance Marking (cont)

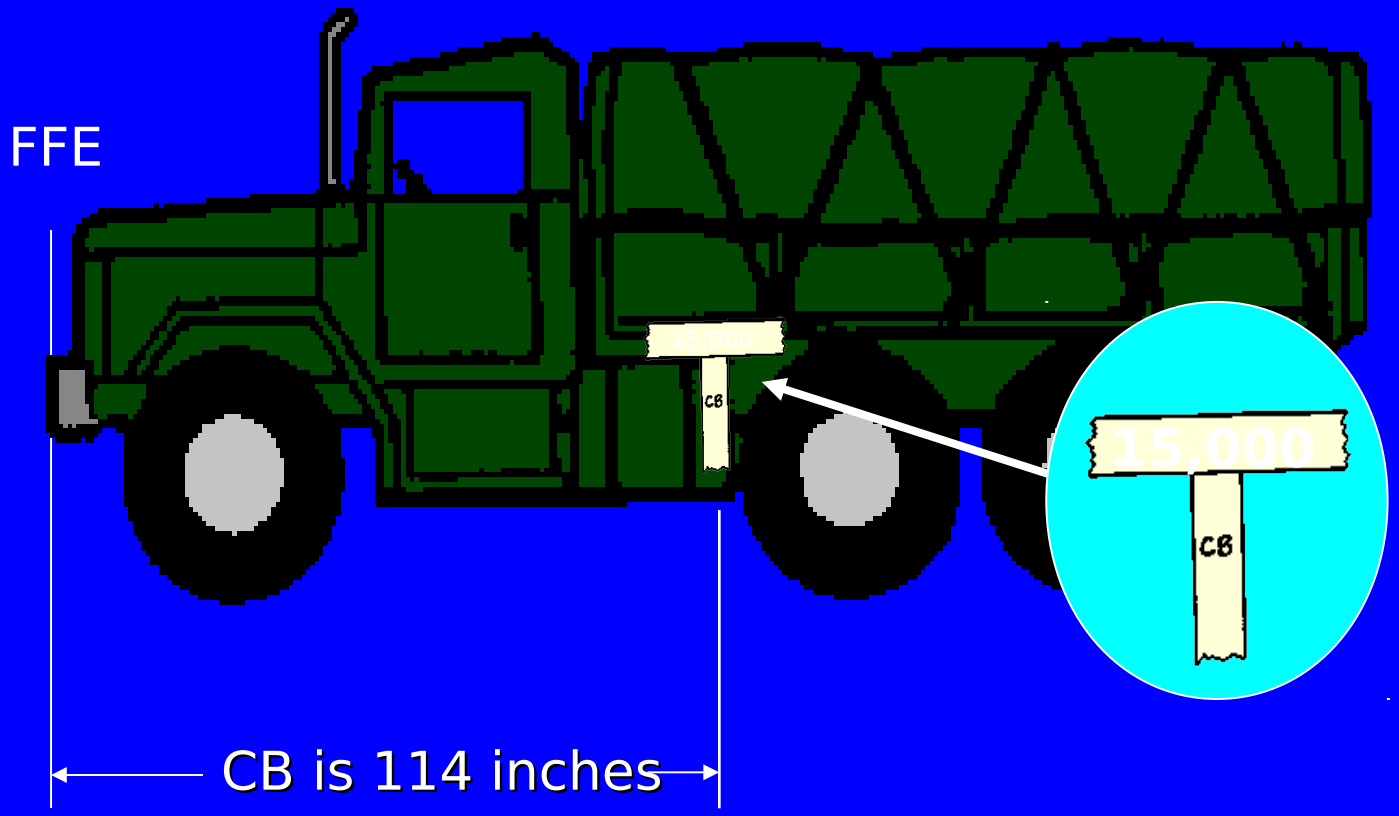
- Equipment that has a cargo carrying capability will
  - Be marked as an empty CB
  - Marked as a loaded CB
- Trucks and towed equipment transported coupled will have an individual CB on reach item (allows them to be disconnected and shipped on separate aircraft)

Center of Balance Marker - Trailer



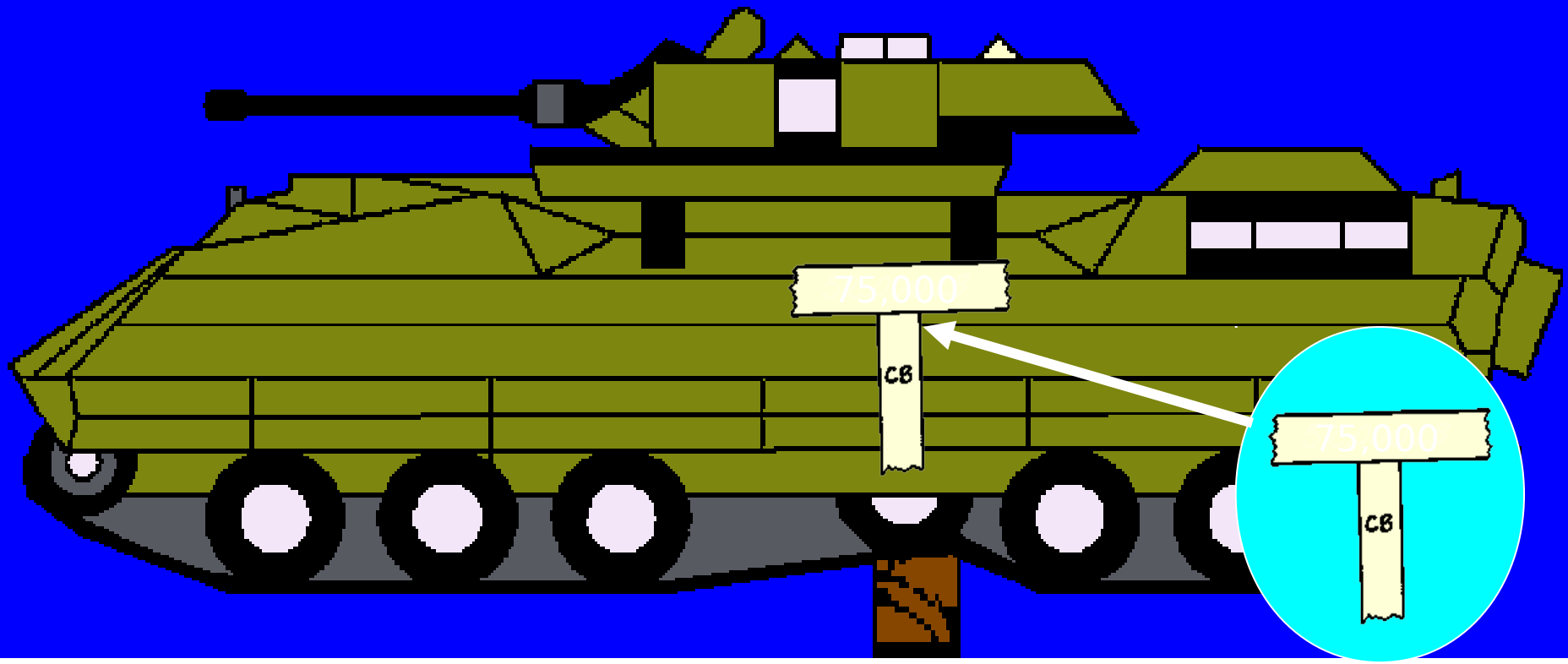
CB is 92 inches from FFE

Center of Balance Marker - Truck



Center of Balance Marker - Tracked Vehicles

- Mark CB at balance point



AIRCRAFT LOAD PLANNING

Aircraft Load Planning

- Deployment planners and deploying unit follow 2 basic steps in developing load plans:
  - Step 1: Identify the total number of personnel, amount of equipment & general sequence of movement
  - Step 2: Design loads for each aircraft

Aircraft Load Planning (cont)

Information gathered in Step 1 is documented on the following preliminary load planning tools:

- DD Form 2327, Unit Aircraft Utilization Plan - Used to estimate the number & types of aircraft that will be needed
- DD Form 2328 - Summarizes the data from DD Form 2327

DD Form 2327

DD Form 2328

Aircraft Load Planning (cont)

General Guidance

- Use DOD 4500.9-R (Defense Transportation Regulations, & FORSCOM/ARNG 55-1
- Position personnel, equipment and supplies to facilitate off-load
  - Avoid floor-loaded cargo on aircraft planned for rolling stock
  - Load vehicles facing the exit ramp
  - Load trailers with their prime mover
  - Place palletized cargo aft (to the rear of the plane) of rolling stock & passengers

Aircraft Load Planning (cont)
General Guidance

- Plan for the use of C-141 or C-17 aircraft for majority of strategic movement of unit equipment & cargo

Aircraft Load Planning (cont)

General Guidance

- C-5 aircraft are limited and are not used for outsize items

Aircraft Load Planning (cont)

General Guidance

- C-130 aircraft are primarily used for tactical airlift operations

Aircraft Load Planning (cont)

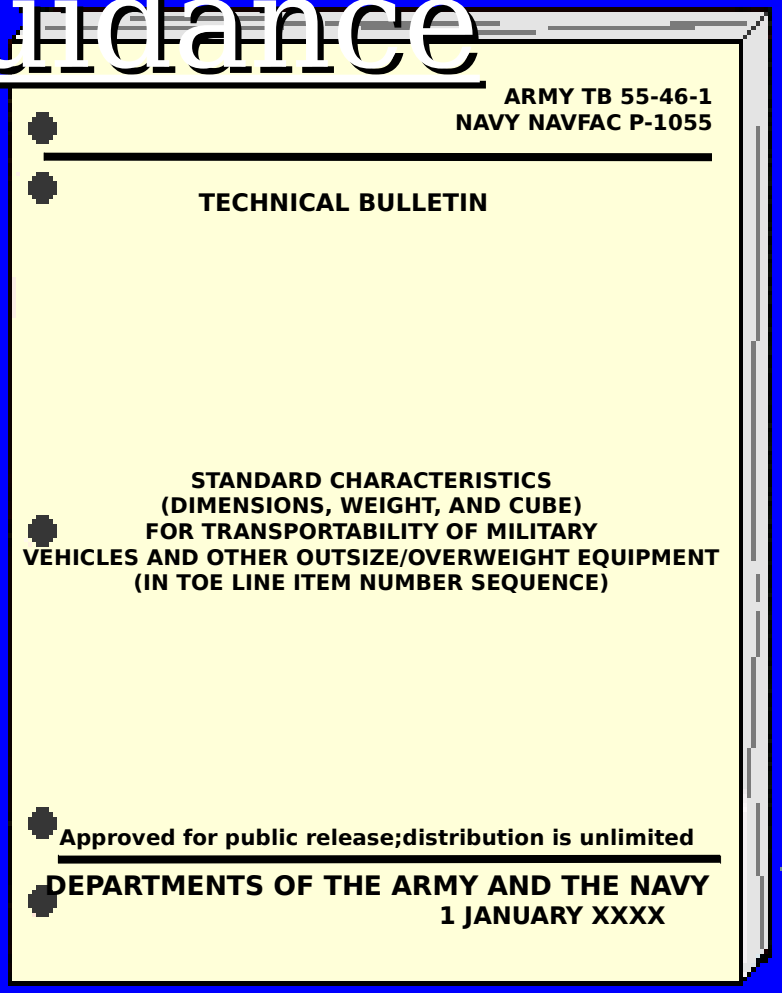
General Guidance

- Identify a minimum of 2 passengers with each load (government or contractor) to act as custodians if aircraft should be diverted & cargo down-loaded somewhere other than original destination
- Qualified operators should be transported with self-propelled vehicles

Aircraft Load Planning (cont)

General Guidance

- Refer to TB 55-46-1 *Standard Characteristics for Transportability of Military Vehicles & Other Outsize / Overweight Equipment* for initial equipment configuration & dimensional planning information


ARMY TB 55-46-1
NAVY NAVFAC P-1055

TECHNICAL BULLETIN

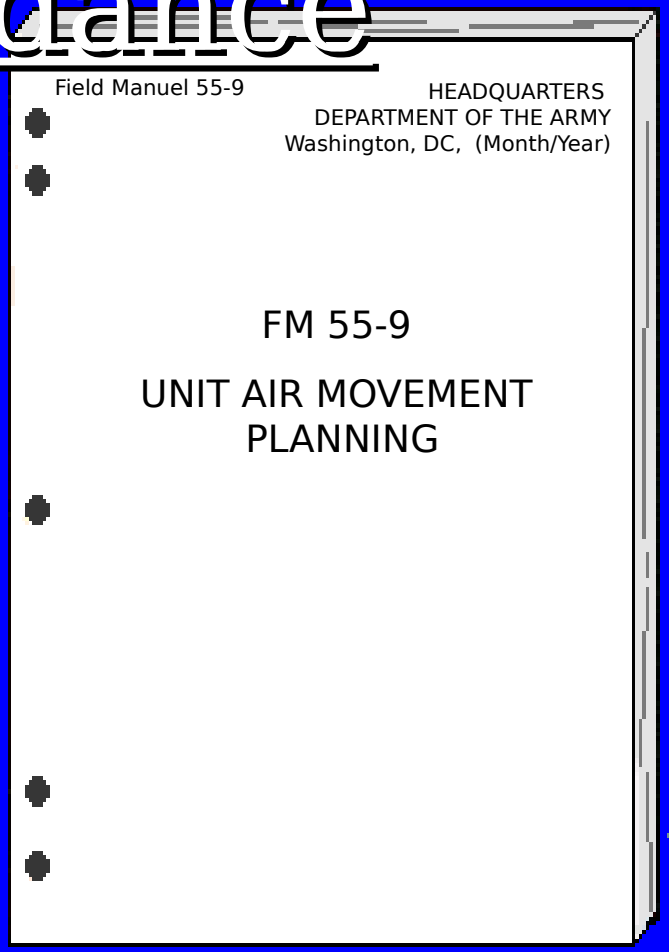
STANDARD CHARACTERISTICS
(DIMENSIONS, WEIGHT, AND CUBE)
FOR TRANSPORTABILITY OF MILITARY
VEHICLES AND OTHER OUTSIZE/OVERWEIGHT EQUIPMENT
(IN TOE LINE ITEM NUMBER SEQUENCE)

Approved for public release;distribution is unlimited

DEPARTMENTS OF THE ARMY AND THE NAVY
1 JANUARY XXXX

Aircraft Load Planning (cont) General Guidance

- Reference FM 55-9 to ensure pallet weight, axle loads, wheel loads, tire footprint loads & general floor loads conform to the fuselage zone, compartment & loading limitations for the aircraft



Aircraft Load Plans

- Identify aircraft allowable cabin load. Seek assistance from higher HQ and UMC early in planning to obtain accurate information on aircraft cabin load for specific deployments
- Goal is to develop load plans that support unit mission while maximizing aircraft utilization
- Cross-loading of like capabilities helps prevent total loss of capability due to aircraft diversion or delay (eg If all of a deploying unit's communications equipment is loaded on a single aircraft, & that aircraft fails to reach the mission location, the unit's communications capability is severely impacted)
- Planning undertaken by a qualified Airload Planner (hold an AMC Form 9 [Airlift Load Planning Certification] - 8 to 10 day course) - one

Manifests

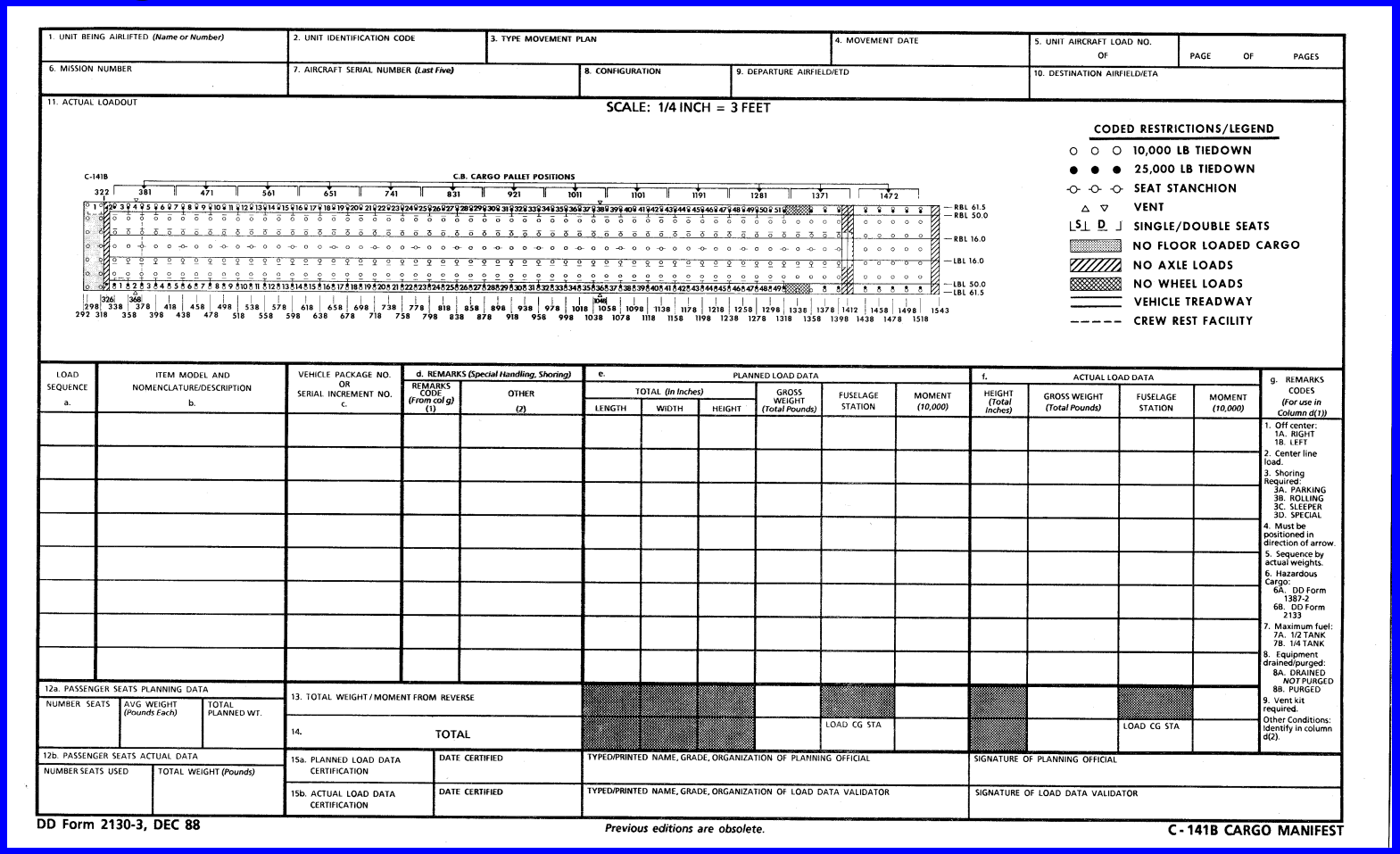
- DD Form 2328 takes the data from DD Form 2327 & summarizes it to identify quantities & type of aircraft planned for the air move
- Once loads have been designed for each aircraft, prepare:

  DD Form 2130 Cargo Manifest (also known as 'Load Plans)

  - DD Form 2130-1 C-5
  - DD Form 2130-2 C-130
  - DD Form 2130-3 C-141
  - DD Form 2130-6 KC-10 (17 pallets configuration)
  - DD Form 2130-7 KC-10 (23 pallets configuration)
  - DD Form 2130-13 C-17

Manifests (cont)

- DD Form 2130 Cargo Manifest (Lists all cargo loaded on aircraft)



1. UNIT BEING AIRLIFTED *(Name or Number)*	2. UNIT IDENTIFICATION CODE	3. TYPE MOVEMENT PLAN	4. MOVEMENT DATE	5. UNIT AIRCRAFT LOAD NO. OF	PAGE OF PAGES
6. MISSION NUMBER	7. AIRCRAFT SERIAL NUMBER *(Last Five)*	8. CONFIGURATION	9. DEPARTURE AIRFIELD/ETD	10. DESTINATION AIRFIELD/ETA	

11. ACTUAL LOADOUT

SCALE: 1/4 INCH = 3 FEET

C-141B — C.B. CARGO PALLET POSITIONS

322 381 471 561 651 741 831 921 1011 1101 1191 1281 1371 1472

RBL 61.5 RBL 50.0 RBL 16.0 LBL 16.0 LBL 50.0 LBL 61.5

CODED RESTRICTIONS/LEGEND

- 10,000 LB TIEDOWN
- 25,000 LB TIEDOWN
- SEAT STANCHION
- VENT
- SINGLE/DOUBLE SEATS
- NO FLOOR LOADED CARGO
- NO AXLE LOADS
- NO WHEEL LOADS
- VEHICLE TREADWAY
- CREW REST FACILITY

LOAD SEQUENCE a.	ITEM MODEL AND NOMENCLATURE/DESCRIPTION b.	VEHICLE PACKAGE NO. OR SERIAL INCREMENT NO. c.	d. REMARKS *(Special Handling, Shoring)* REMARKS CODE *(From col g)* (1)	d. REMARKS OTHER (2)	e. PLANNED LOAD DATA TOTAL *(In Inches)* LENGTH	WIDTH	HEIGHT	GROSS WEIGHT *(Total Pounds)*	FUSELAGE STATION	MOMENT *(10,000)*	f. ACTUAL LOAD DATA HEIGHT *(Total Inches)*	GROSS WEIGHT *(Total Pounds)*	FUSELAGE STATION	MOMENT *(10,000)*	g. REMARKS CODES *(For use in Column d(1))*
13. TOTAL WEIGHT / MOMENT FROM REVERSE															
14. TOTAL									LOAD CG STA				LOAD CG STA		

1. Off center: 1A. RIGHT 1B. LEFT
2. Center line load.
3. Shoring Required: 3A. PARKING 3B. ROLLING 3C. SLEEPER 3D. SPECIAL
4. Must be positioned in direction of arrow.
5. Sequence by actual weights.
6. Hazardous Cargo: 6A. DD Form 1387-2 6B. DD Form 2133
7. Maximum fuel: 7A. 1/2 TANK 7B. 1/4 TANK
8. Equipment drained/purged: 8A. DRAINED *NOT* PURGED 8B. PURGED
9. Vent kit required.

Other Conditions: Identify in column d(2).

12a. PASSENGER SEATS PLANNING DATA NUMBER SEATS	AVG WEIGHT *(Pounds Each)*	TOTAL PLANNED WT.

12b. PASSENGER SEATS ACTUAL DATA NUMBER SEATS USED	TOTAL WEIGHT *(Pounds)*

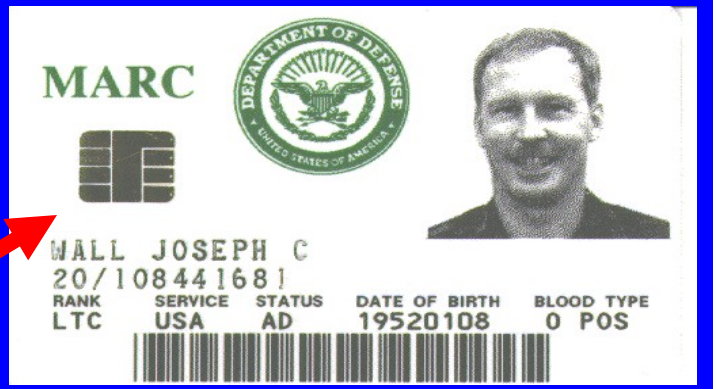
15a. PLANNED LOAD DATA CERTIFICATION	DATE CERTIFIED	TYPED/PRINTED NAME, GRADE, ORGANIZATION OF PLANNING OFFICIAL	SIGNATURE OF PLANNING OFFICIAL
15b. ACTUAL LOAD DATA CERTIFICATION	DATE CERTIFIED	TYPED/PRINTED NAME, GRADE, ORGANIZATION OF LOAD DATA VALIDATOR	SIGNATURE OF LOAD DATA VALIDATOR

DD Form 2130-3, DEC 88 — *Previous editions are obsolete.* — C-141B CARGO MANIFEST

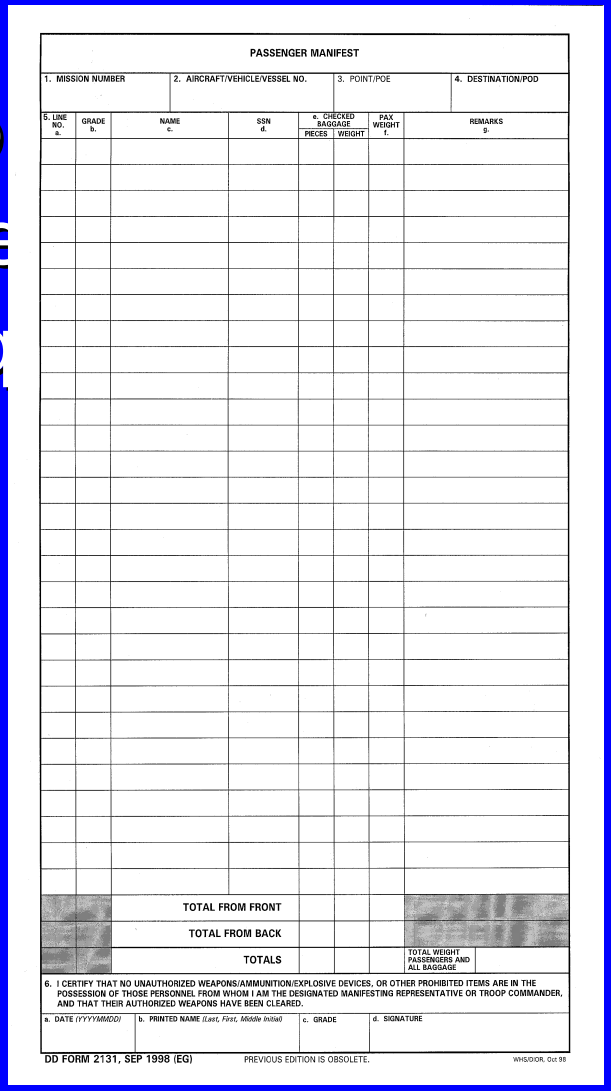
C-141B Cargo Manifest (DD Form 2130-3)

Manifests (cont)

- DD Form 2131 Passenger Manifest (lists all personnel aboard aircraft)
- Zero defects - 100% accountab
  - CONUS movements - 7 copie
  - OCONUS movements - as req by foreign customs



ID Card for accountability check



PASSENGER MANIFEST

1. MISSION NUMBER	2. AIRCRAFT/VEHICLE/VESSEL NO.	3. POINT/POE	4. DESTINATION/POD

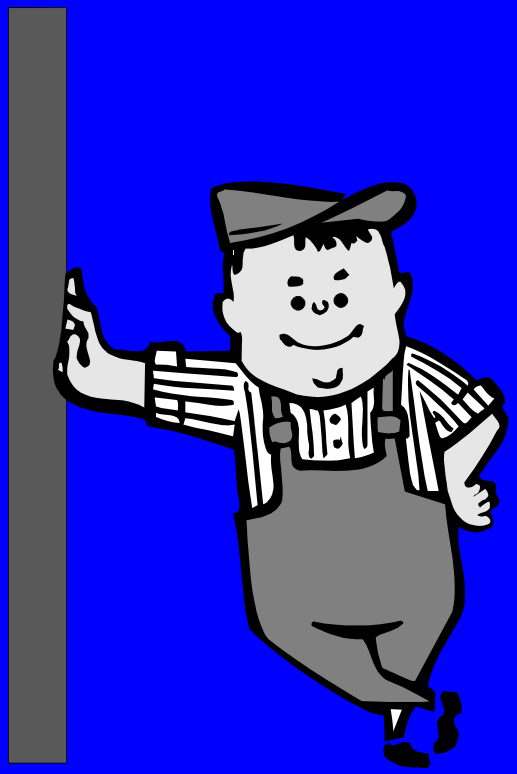
5. LINE NO. a.	GRADE b.	NAME c.	SSN d.	e. CHECKED BAGGAGE PIECES	e. CHECKED BAGGAGE WEIGHT	PAX WEIGHT f.	REMARKS g.
		TOTAL FROM FRONT					
		TOTAL FROM BACK					
		TOTALS					TOTAL WEIGHT PASSENGERS AND ALL BAGGAGE

6. I CERTIFY THAT NO UNAUTHORIZED WEAPONS/AMMUNITION/EXPLOSIVE DEVICES, OR OTHER PROHIBITED ITEMS ARE IN THE POSSESSION OF THOSE PERSONNEL FROM WHOM I AM THE DESIGNATED MANIFESTING REPRESENTATIVE OR TROOP COMMANDER, AND THAT THEIR AUTHORIZED WEAPONS HAVE BEEN CLEARED.

a. DATE (YYYYMMDD)	b. PRINTED NAME (Last, First, Middle Initial)	c. GRADE	d. SIGNATURE

DD FORM 2131, SEP 1998 (EG) PREVIOUS EDITION IS OBSOLETE. WHS/DIOR, Oct 98

Shoring



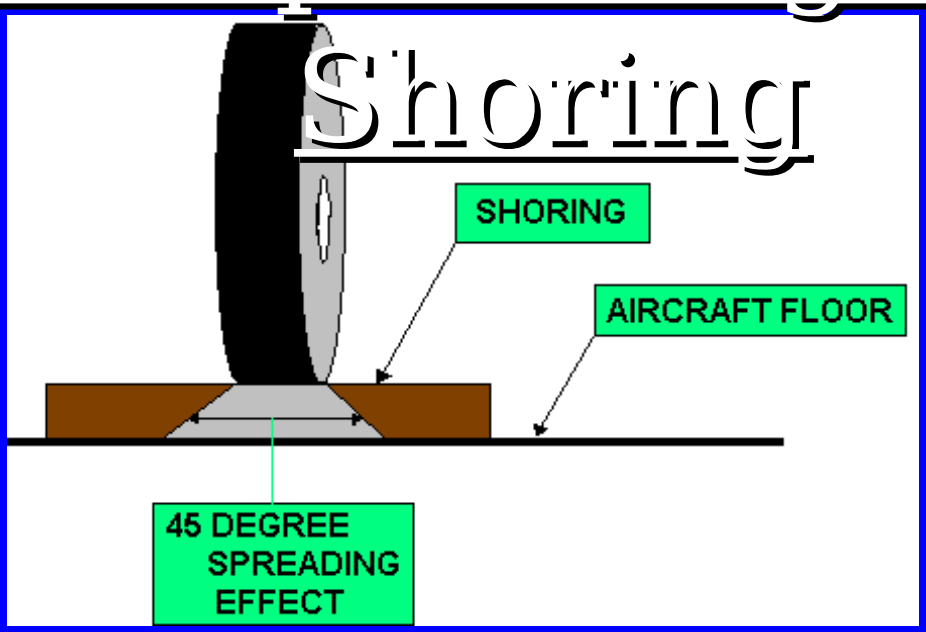
Shoring

- Lumber or planking material
- Protects aircraft cargo floor and ramps from damage
- Increases cargo contact areas for better load distribution
- Decreases the approach angle of the aircraft cargo ramps
- Provided by transported unit
- Minimum thickness for all shoring = 3/4 inch. Actual dimensions driven by weight, contact area and aircraft limitations
- Aircraft load master will supervise the placement of

Load Spreading/Weight Distribution

- Weight exerts a certain amount of pressure determined by its supporting contact area
- Load spreading is a physical process that distributes a concentrated weight over a larger area

Load Spreading Using Shoring



- The contact area can be increased at a 45 degree angle from the upper surface of the shoring to the cargo floor
- The increased contact area decreases the pressure on the floor allowing the carriage of an otherwise prohibited piece or cargo
- Important notes
  - Shoring will only increase the area of contact

Types of Shoring

- Rolling
- Parking
- Sleeper
- Special

Rolling Shoring

- Used on ramps and cargo floor areas over which a vehicle must roll when being loaded/unloaded from an aircraft
- Protects aircraft floors and ramps from damage
- Used primarily with tracked vehicles (any vehicle with tracks, cleats, studs or other gripping devices or treads where there will be metal-to-metal contact requires rolling shoring). Generally not required for wheeled vehicles as they do not exceed weight limitations (Tracked vehicles could deploy with new rubber pads but redeploy with worn pads & need shoring)

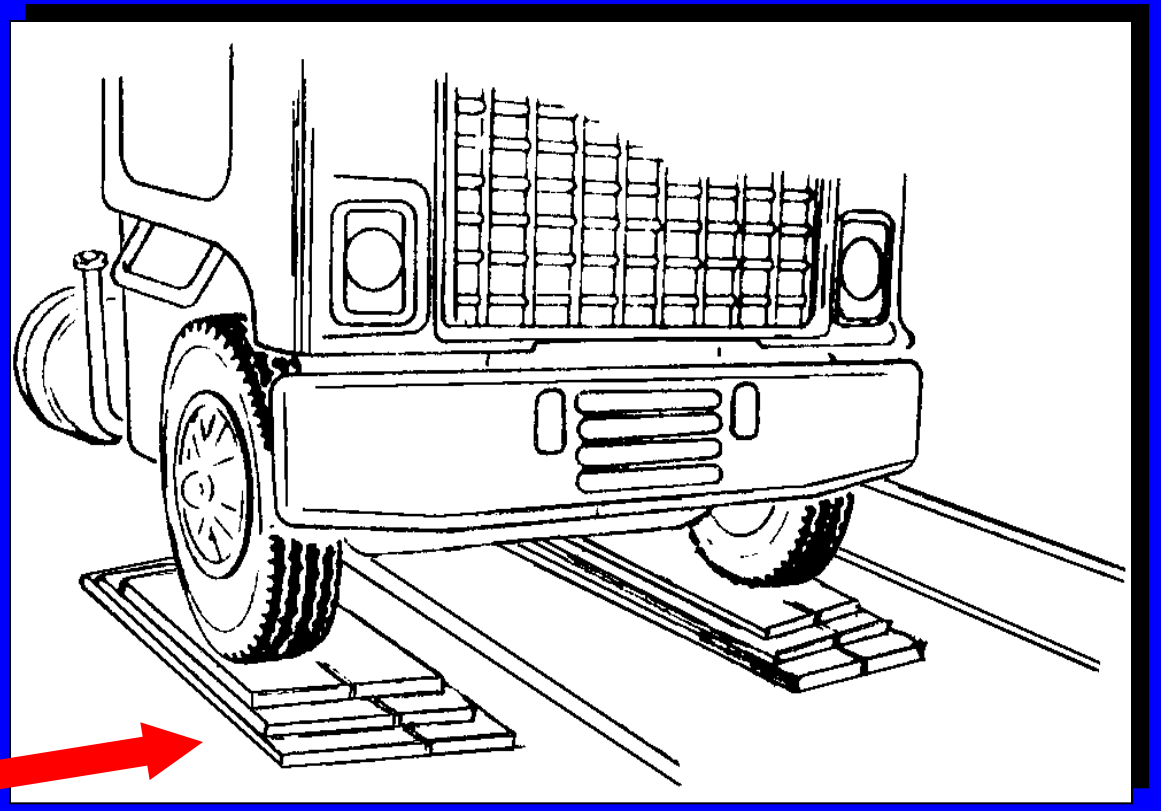
Rolling Shoring (cont)

Rolling shoring used on aircraft ramp

Used to protect the floor from vehicles with cleats, studs or other gripping devices

Parking Shoring

- Generally, if you need rolling shoring you will need parking shoring

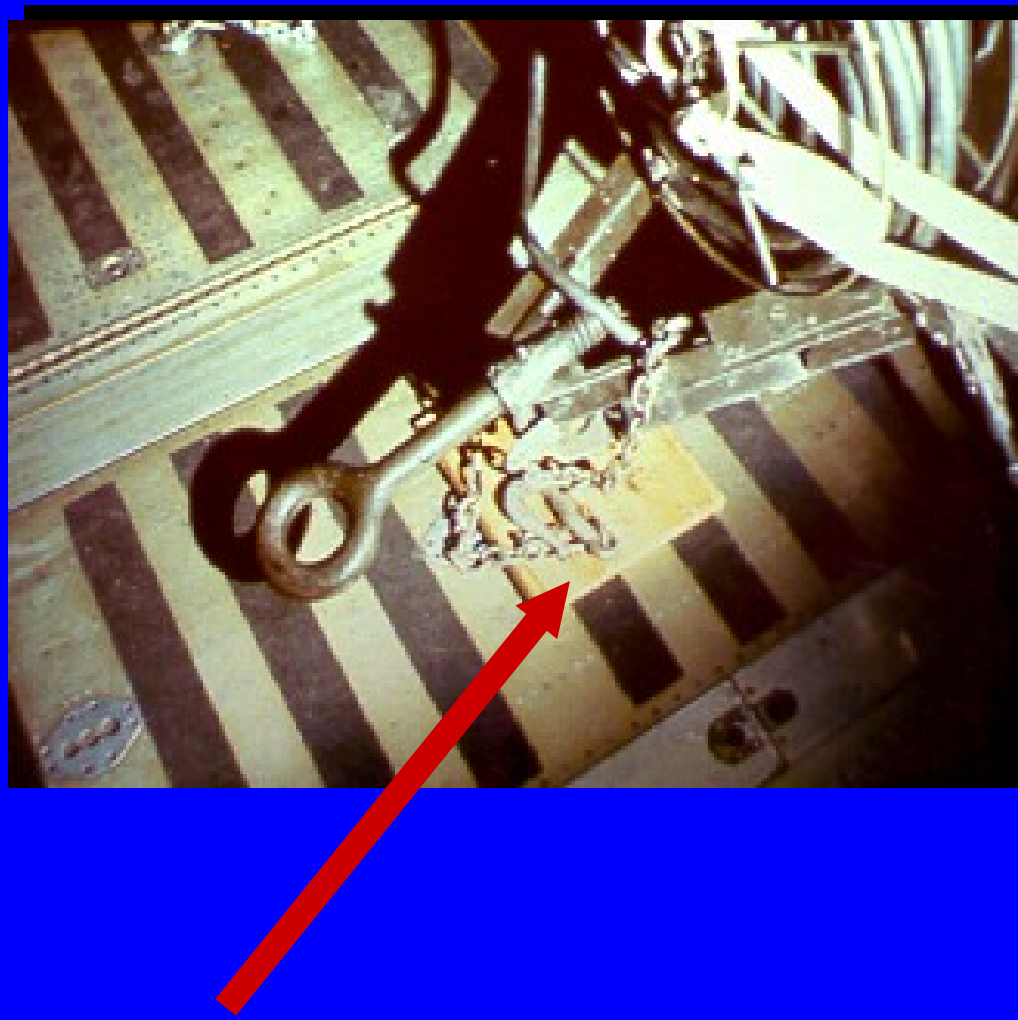


Parking Shoring (cont)

- Used under items when loaded and parked aboard the aircraft
- Protects aircraft floor from damage during flight
- Prevents metal-to-metal contact
  cargo with aircraft cargo compa
  floor (consider blades, bucke
  fork-lift tines etc)
- Distributes cargo weight over a l
  contact area of cargo compartment floor

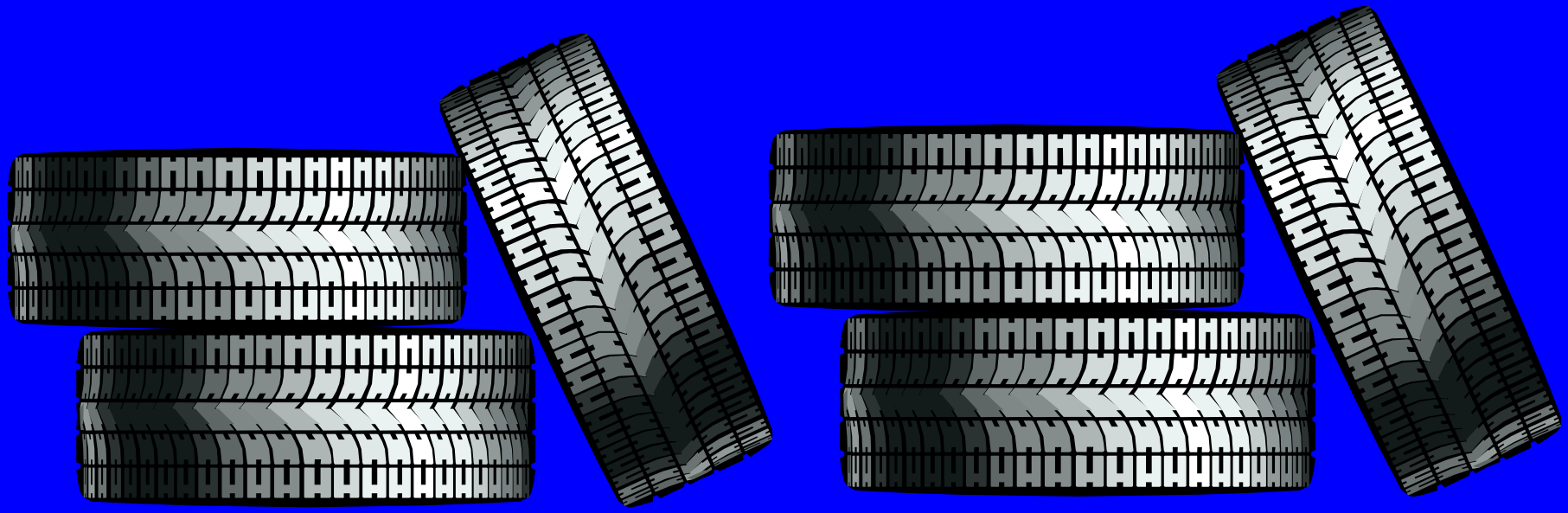
Parking Shoring (cont)

- All trailers with a tongue that could rest on the aircraft floor should be shipped with parking shoring, whether connected to or disconnected from its prime mover



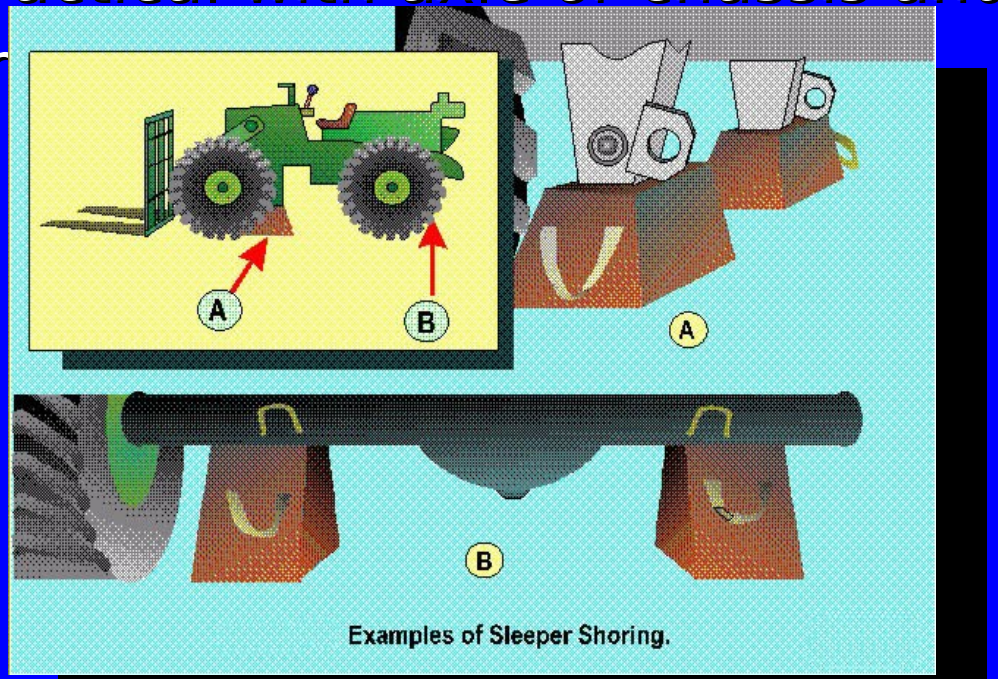
Parking Shoring (cont)

- Most pneumatic tires do not normally require parking shoring, the tires that do are usually narrow and/or very heavy or hard rubber



Sleeper Shoring

- Use under frames or axles of vehicles that weigh over 20,000 pounds with soft, low pressure, balloon-type, off road tires that are not designed for highway travel (eg forklifts, road graders etc)
- Sleeper shoring used to prevent the vehicle from bouncing up and down and possibly pulling the tie down rings out of aircraft floor
- Placed flush as practical with axle or chassis and secured to prever



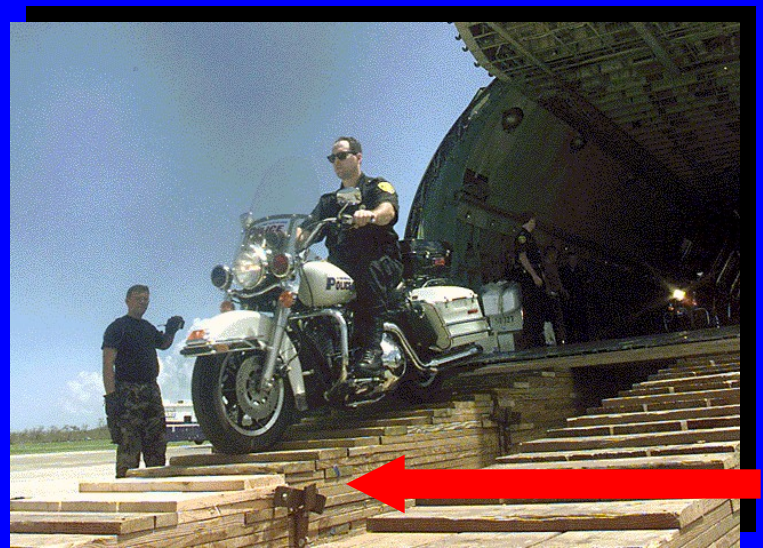
Examples of Sleeper Shoring.

Special Shoring

- All other types of shoring
  - Approach shoring
  - Ramp pedestal shoring

Special Shoring - Approach Shoring

- Use approach shoring to decrease the approach angle of aircraft loading ramps
- Prevents tall and long items o cargo from striking the aircra ground during loading/offload operations

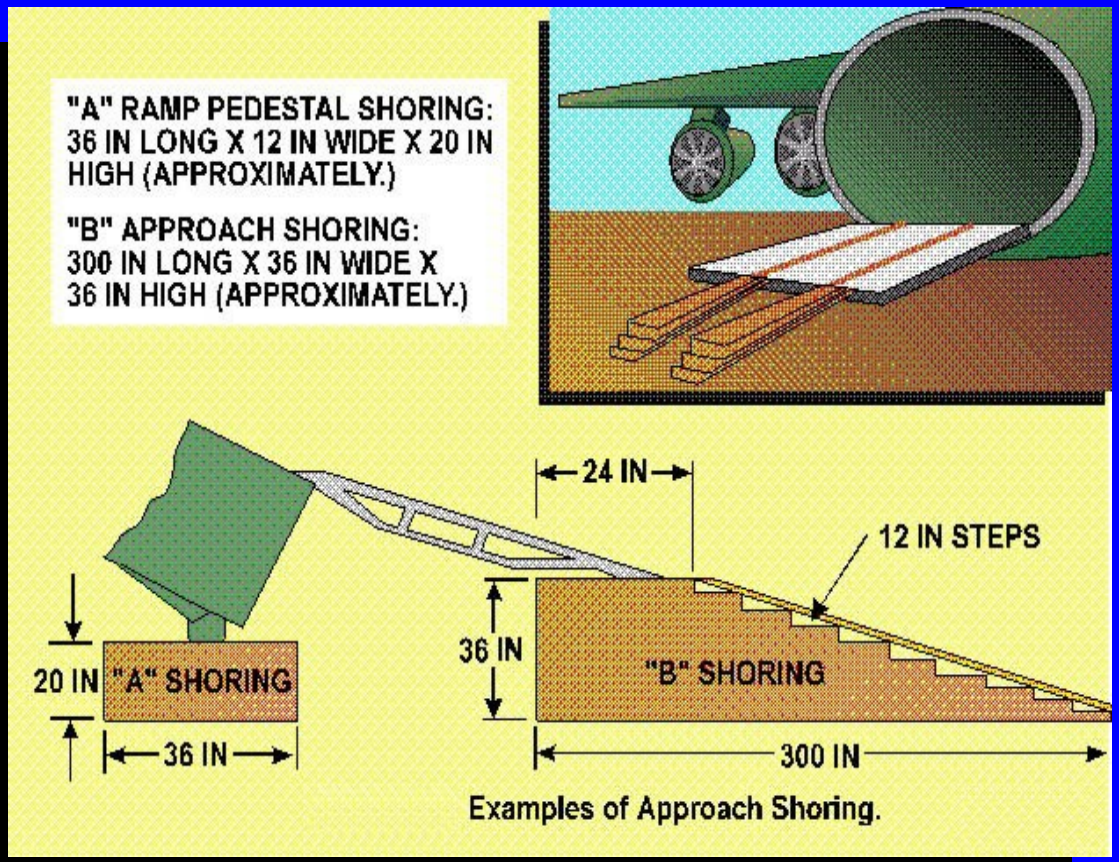


Special Shoring - Approach Shoring (cont)

- Decreases angle or slope of the aircraft cargo ramp
- Reduces upward projection of cargo to provide overhead and/or ground clearance
- No standard method
- Used when ground clearance is limited
- Examples:
  - Most helicopters
  - All 40K loaders
  - Long vehicles

Special Shoring - Ramp Pedestal Shoring

- Decreases angle of the aircraft cargo ramp
- Consists of lumber placed under the aft end of the cargo ramp
- Primarily used with C-141b aircraft ramp



Examples of Approach Shoring.

Summary

- Initial Planning
- Personnel
- Equipment Preparation and Joint Inspection
- Center of Balance
- Shoring